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A Glance at the Contents—

Annual Meeting of the Institution.

We publish the provisional programme of the First International Gas Conference and of the Annual Meeting of the Institution of Gas Engineers, which is to be held in London from June 2 to 5. [p. 419.]

Revised Scale of Charges at Leeds.

In the "JOURNAL" for April 29, p. 271, we gave an outline of the new scale of charges which was approved by the Gas Committee at their meeting on April 22. The scheme came before the City Council on May 6, and was adopted by a good majority. [p. 416.]

London and Southern District Juniors.

The Annual General Business Meeting of the London and Southern District Junior Gas Association was held at the Westminster Technical Institute on Friday, May 1—Mr. T. H. Prater, of Margate, the President, in the Chair. The President gave a brief review of the past session's work, referring also to the education of juniors in the Gas Industry. [p. 431.]

Report of the Livesey Professor at Leeds.

Prof. John W. Cobb, C.B.E., B.Sc., F.I.C., Livesey Professor at the University of Leeds, has submitted his report, published in this week's issue, for the sessions 1928-29 and 1929-30 to the Chairman (Mr. C. F. Tetley, M.A., LL.D.) and members of the Livesey Advisory Committee on the work of the Department of Coal Gas and Fuel Industries (with Metallurgy). [p. 434.]

New Showrooms Opened at Woodford.

New showrooms, offices, and stores were opened on May 5 by the Gas Light and Coke Company in South Woodford. The opening ceremony was performed by Sir James Hawkey, J.P., Chairman of the Woodford Urban District Council, Mr. R. W. Foot, General Manager of the Company, presiding in the unadvoidable absence of the Governor, Sir David Milne-Watson. [p. 422.]

Water Tank Gasholders.

In an article on this subject to-day, Mr. J. C. K. Balfry, M.I.Mech.E., discusses the relationship of capacity and diameter of water tank gasholders and a constant K. Objections to a tall structure, he says, may be lodged by private persons, institutions, or public bodies pressed to take action by force of public opinion. Hence it is very important to know, before proceeding too far in settling the size of the tank, and even of the holder, whether opposition of a serious nature is likely to be lodged against the erection of the proposed structure. [p. 425.]

Colombo Gas and Water Company, Ltd.

A report of the annual general meeting of the Company, which was held last week, is published. [p. 432.]

Salary of Elland's Assistant Engineer.

The salary of the vacant post of Assistant Engineer to the Elland-cum-Greetland Gas Company is re-advertised in the "JOURNAL" to-day at £300 per annum. [p. 442.]

Mr. Wilkinson Resigns.

At a meeting of the Nottingham Corporation Gas Committee last Friday, a communication was read from Mr. John Wilkinson tendering his resignation from the position of Gas Engineer and Manager. [p. 413.]

The Case for Benzole Recovery.

Mr. Charles Cooper, M.Sc., sets out convincing arguments in favour of the re-institution of benzole recovery on gas-works, where carbonizing conditions permit of a reasonable quantity and quality of product. [p. 417.]

Gas Exhibition at Redhill.

The East Surrey Gas Company, in co-operation with a number of appliance manufacturers, held a most successful gas exhibition in the Market Halls, Redhill, last week. The Mayor of Reigate performed the opening ceremony. [p. 419.]

B.C.G.A. District Conference.

A Conference of the Midland District of the B.C.G.A. was held in Shrewsbury last Thursday, when Mr. A. H. Barker gave an address on "Gas for Water Heating and House Heating." During the discussion, Mr. H. J. Woodfine, President of the Midland Association of Gas Engineers and Managers, referred to two colleges, one of which takes 9 million c.ft. of gas per annum, and the other 2 millions. In the first establishment the consumption has grown from 100,000 c.ft. a year. [p. 427.]

Views on Gas Fires.

"In my view some form of gas fire must be designed which has a more or less close resemblance to a coal fire, and which can be turned low without spoiling its appearance. It must be capable of producing a brightly glowing effect when only burning a small quantity of gas, so as to be in the nature of a dummy fire which can be lighted for comfort's sake on a summer evening without throwing out a great deal of heat, but still retaining a good appearance."—Mr. A. H. Barker before the "B.C.G.A." Midlands District Conference. [p. 427.]

EDITORIAL NOTES

International Gas Conference

THE response to an invitation issued by the Institution of Gas Engineers on Oct. 28, 1930, has been such that it has been found possible—albeit at somewhat short notice for an event of such importance—to arrange for the first international gas conference to be held under the auspices of the Institution and concurrently with the 68th Annual General Meeting in London on June 2, 3, 4, and 5, 1931. Delegates from overseas Gas Associations will be present, and two representatives, Mr. Clifford E. Paige, President of the American Gas Association, and Dr. H. Schütte, Immediate Past-President of the German Gas and Water Association, will read papers. The programme of the meeting has been arranged to accord with the international aspect of the gathering, and among an unusually varied and attractive number of features is a banquet to the Overseas Representatives at Grosvenor House.

It is appropriate that the Institution of Gas Engineers should take the initiative in this matter, since, in addition to organizing the first International Gas Exhibition in London in 1904, it is the second oldest Gas Organization in existence, having been founded in 1863. The German Association was inaugurated four years earlier (1859), and the American Gas Association held its first meeting in 1872, being followed in 1873 by Switzerland and the Netherlands, and in 1874 by France and Italy. To-day the Institution of Gas Engineers corresponds with nineteen Gas Associations overseas. It is one of the senior technical and professional bodies in the country.

The Institution Programme

As for the programme, this should satisfy, in every respect, the taste of all. At the first session on Tuesday, June 2, we have, for instance, in addition to the Presidential Address of Mr. H. E. Copp, and the paper by Dr. Schütte, a discourse on intermittent vertical chambers by Mr. J. S. Thorman, while Mr. A. L. Holton will take as his subject the topical one of the semi-direct recovery of ammonia in gas-works practice and the recovery of tar acids from ammoniacal liquor. This deals with a peculiarly delicate and vital problem; and though it is essentially of local rather than general significance, it is certain to "draw a crowd." And then, of course, we have our photographs taken.

Wednesday afternoon! There are no papers then; and we would not be so crude as to suggest that there could be any alternatives to the visits which have been arranged for members and ladies. "London by Night," too, sounds highly attractive, and it will doubtless appeal strongly not merely to the younger engineers. That is, of course, if engineers are like they were in our day. On Wednesday night there is also the President's dinner to the Council and Representatives from Overseas.

And so we come to Thursday, and though a day has intervened we shall not have forgotten the President's reception and dance on the Tuesday night, held at a "gate-crasher's" paradise—the Park Lane Hotel. We shall assemble, as before, at the Great Hall of the Institution of Civil Engineers, and on the steps of that building of learning we shall enjoy a few more handshakes, and one will whisper to the other, How did you get on yesterday? We refrain from giving the answer, but pass into the Hall, and hear, first of all, Dr. R. Lessing on a subject which is surely associated with his name. Though we doubt whether there is any need to mention it, this subject is "Clean Coal." Then Mr. R. N. Webb, a thorough-going Yorkshireman, will describe an experiment in controlling pressure conditions within coal-gas retorts. In the afternoon, following the Council's luncheon to the President, the ladies depart for Windsor, and will doubtless be impressed by the Royal Chapel, so redolent of austere British tradition and compelling restraint. The men, on the other hand, as befits the breadwinner, will enjoy Mr. J. H. Clegg's account of the new Oswald Street Gas-Works of the Burnley Corporation. And at four o'clock, we are told, the concluding business of the conference commences.

Of course, the delights of the meeting are not over. Let those who doubt this statement turn to later pages of our issue to-day, when they will discover all sorts of possibilities for Friday, June 5.

We feel sure that the conference of the Institution this year will be a success from the aspects of international fellowship, technical work, and social charm; and we feel sure also that all who attend it will come with a light heart and a ready brain, so that the meeting may yield the best, the most lasting, results for the welfare of our great Industry.

Low-Temperature Tar Oil Research

INTEREST in the subject of low-temperature carbonization has been further aroused by the announcement made in Parliament last week by Mr. Charles Edwards, on behalf of the Secretary of Mines. After making a statement in answer to a question regarding the closing-down in February last of the experimental plant at the Richmond Works of the Gas Light and Coke Company, Mr. Edwards went on to say that, in conjunction with the Department of Scientific and Industrial Research, careful consideration had been given to the question of how best the Government could assist the development of low-temperature carbonization and other processes for the scientific treatment of coal. It is the opinion of the Government that the development of these processes should be encouraged, as their successful operation would be of benefit to the coal mining industry and to the country generally.

The conclusion come to by the Government is that there are two main directions in which effective help might be given—by utilizing the tar oils for the production of motor spirit and Diesel oil, and by inducing a wider use of smokeless low-temperature fuel. It is proposed to embark at once on the first of these schemes. The erection of the necessary plant is estimated to cost £33,500, to which will have to be added an annual outlay for staff and maintenance of £8000. The Board of Scientific and Industrial Research are also prepared to make a grant on the usual conditions for research on tar oils by any recognized association connected with the industry.

It is unnecessary to stress the sad condition in which the coal mining industry finds itself. Amelioration of its position must be the wish of everybody, and proposals having this for their object are assured in advance of sympathetic consideration. The problem affords work for the best brains, and any assistance that the "JOURNAL" can render towards its solution, by the publication of suggestions for securing the best results from the national point of view, will be readily given. Will those who may have proposals to put forward regard this as an invitation, and respond quickly? The need of the coal industry is urgent.

In view of the fact that gas undertakings are in a better position than anyone else to take advantage of the results which may be obtained from this research, the matter is one which closely concerns us. Work carried out by the Fuel Research Board will, we know, be conducted with complete impartiality, and the results obtained will be published without reservations for the benefit of all concerned.

Benzole Recovery

As far as the Gas Industry is concerned, the only bright feature of the " doleful " 1931 Budget is the imposition of a tax on petrol. This, together with the existing 4d., is tantamount to a tax of 6d. in favour of benzole. Though the extra twopence a gallon may not be sufficient to bring about a feverish rush by gas undertakings to extract benzole from their gas, it is something; and it will do a power of good if only it directs attention once again to the broad question of benzole recovery from town gas. It is a broad question, and it devolves, of course, into the final assessment of the value of the therm as liquid benzole, either crude or refined, in relation to its value in the form of gas. To arrive at this assessment, several questions have to be satisfactorily answered, chief among which are: Would existing carbonizing plant be worked more economically with greater regularity in the throughput of coal; and is an extra consumer equal to 5 p.ct. of the output—a consumer, moreover, requiring no distribution and maintenance costs—desirable?

On scientific and theoretical grounds and also from a national viewpoint, there is everything to be said for benzole recovery at gas-works; for it must be obvious that the more bye-products of an essential nature our Industry produces, the more important " gas " will become as an asset to the nation. And it has to be remembered that the sales of imported motor spirit help to simplify the task of fuel oil in competition with gas. In brief, benzole recovery cannot fail to enhance the prestige of the Gas Industry. Then, from our own point of view, the recovery of benzole affords a means of control of calorific value which is technically much sounder than such methods as " stretching " or " overpulling," or the admixture of producer gas or flue gases. Again, there is the question of gum formation on the district (and such " gumming " has assumed a larger significance owing to the increasing employment of thermostatic control and governing of gas appliances). Here, too, as far as we can gather, benzole recovery is helpful, for there is evidence that those undertakings who are distributing debenzolized gas are freer from naphthalene and gum stoppages than are the majority who do not remove benzole from the gas. Also, from the Gas Industry's point of view there is advantage to be gained in competition with electricity where arrangements can be made for a local sale of benzole which will favour motor traction in place of electric traction. We certainly know of one town in this country where, because the local gas undertaking is able to recover benzole, it seems probable that motor 'buses will ultimately replace tramcars.

It must be borne in mind, too, that since the war great improvements have been effected in the technique of benzole recovery and in the plant available for the purpose; and we call attention to an important and valuable article on the subject which Mr. Charles Cooper contributes to our columns to-day. The author has carried out much original work on benzole recovery, and we are sure that our readers will be glad to have his views, and will find of the greatest interest his closely reasoned case for the re-institution of benzole recovery on gas-works, where carbonizing conditions permit of a reasonable quantity and quality of product. He describes a gas oil recovery plant which is in effect a specially designed benzole plant which will strip the gas oil, recover the benzole and naphthalene in separate fractions, and return the oil to the washer. The institution of this double fraction distillation has not been found in practice to cause any increase in supervision, owing to the excellent thermostatic and other controls which are now obtainable from instrument firms. Mr. Cooper summarizes his arguments in favour of benzole recovery concisely: A definite increase in sales, employing substantially only existing plant and labour; additional plant and labour required for the recovery plant itself are well covered by the revenue obtained; complete naphthalene removal is procured by the benzole recovery plant; an almost complete elimination of gum-forming constituents can be expected; and calorific value adjustment is obtained without increasing inerts.

It is on the economic basis, however, that benzole recovery will stand or fall, and in this regard it is essential to attack the problem very carefully. The author observes, for instance, that a gallon of benzole represents 1·6 therms taken from the gas, and that the natural first thought is to multiply this by the price of gas at inlet to holder, to arrive at its worth in the form of gas. But he queries whether it is sound economics to debit the benzole with the full capital charges on carbonizing, washing, and purification plant, and he suggests that such an excellent new consumer as is represented by benzole recovery might well be charged with only the difference between cost of coal and revenue from residuals, *plus* a figure representing a certain portion of the capital and maintenance charges. On this basis he works out a balance-sheet for the recovery of both crude and refined benzole on a works carbonizing between 20,000 and 25,000 tons of coal a year (say, a 300 million works). It will be seen that the production of refined spirit proves the more profitable venture, and that the profit yielded is a reasonable one. Many of our readers will, we have no doubt, be interested in constructing balance-sheets, applicable to their own undertakings, on such lines as those adopted in the article under review.

The Rating of Railways

THERE has recently been issued by the Railway Assessment Authority, constituted under the Railways (Valuation for Rating) Act, 1930, the Apportionment Scheme prepared in pursuance of Section 13 thereof, for the purpose of determining the principles in accordance with which the net annual value of every company's undertaking, as a whole, is to be apportioned between the railway hereditaments in England occupied by each company. The draft scheme, against which representations may be made to the Railway Assessment Authority before May 24, also directs as to the basis on which the expenses of the Authority are to be apportioned among the Councils of the several Counties and County Boroughs in England. The principles of the Act, which applies only to England, and provides that the first quinquennial railway valuation roll shall come into operation on April 1, 1931, as regards places outside London and on April 6, 1931, in relation to London, will, it is understood, be made applicable to Scotland at a later date. It is not proposed here to examine the scheme in detail, but in view of the opinion expressed in many quarters that gas and other public utility undertakings should be valued by a central authority, such as the Railway Assessment Authority, we briefly refer to the matter.

For the purpose of apportionment, the undertaking of a railway company is to be divided into the constituent parts—namely, the railway undertaking, and any canal, dock, or subsidiary undertaking—and the net annual value of the company as a whole is to be applied to each of the several constituent undertakings in proportion to the estimated relative values of such constituent undertakings as a whole, having regard to the benefit, whether pecuniary or otherwise, from carrying on each particular undertaking. The apportionment of the valuation, thus arrived at, of the " principal undertaking " (*i.e.*, the railway) is prescribed, and rules are laid down as to the manner in which the Authority shall ascertain for this purpose the gross receipts of each section.

The Act of 1930 was the natural outcome of the amalgamation of railways which was effected under the Railways Act, 1921, with the consequent anomalies as regards valuation for rating. Provision was made in the Rating and Valuation Bill, 1925, for the assessment of these and other " special properties," but the clauses were subsequently withdrawn for the purpose of further consideration. Now that the Railway Companies of England have received this recognition that such properties require special attention for rating purposes, we are led to hope that the outcome of the conference between representatives of the gas, water, and electricity interests, to which reference was made at the last meeting of the National Gas Council, will be no less satisfactory. It should be noted that an appeal from the decision of the Railway Assessment Committee may be made, on certain specified grounds, to the Railway and Canal Commissioners.

CORRESPONDENCE

"Flame Photographs"

SIR,—May I be permitted a few words in reply to the letter appearing under the above heading in the "JOURNAL" for April 15, 1931?

When I visited the Berlin Gas and Water Exhibition in 1929, many excellent pyrographs were on view showing the flame distribution of different kinds of burners; this method of studying burners was also found to be in regular use in the Tegel Laboratory of the Berliner Städtische Gaswerke.

The method appealed very strongly to the members of the Joint Research Committee, and a full description was therefore given in the 25th Report of that Committee. The report does not contain the name of the originator of the scheme, as I was unfortunately unable to obtain this during my visit.

We would naturally wish that credit should be given to the right person in this matter, and therefore thank Herr Dipl. Ing. Frei for calling attention to his published work on this subject. We trust that this statement will prove a sufficient acknowledgment of his claims, and will remove any misunderstanding.

I would point out that the study of the flames of commercial burners is by no means new, and that Thomas Fletcher, in 1886, used pieces of paper pasted on to the bottoms of pans as an aid to studying the nature of heat transmission from flames. Further, I believe that in the laboratories of the Gas Light and Coke Company discs of sheet copper have been used for essentially the same purpose as that proposed by Dr. Frei. In this case the regions of greatest heat transfer are shown by oxidation markings on the plate.

JAMES W. WOOD,
Research Chemist.

Department of Coal Gas and Fuel Industries,
The University, Leeds,
May 8, 1931.

"Leaping Flames"

SIR,—In your comments on the paper I recently presented to the Institute of Fuel you criticize my remarks upon the open fire, especially my statement concerning "leaping flames." I am afraid that I have been a little misunderstood, for I deplore the prejudice that exists towards this as much as you do yourselves, and I fully agree with you that this "'leaping-flame' business has been overdone." It *has* been overdone, but obviously does exist, and it is necessary to take it into account when considering the difficulties of domestic smoke abatement. But, as I indicated in the discussion on the paper, this sentimental regard for flames can be overcome and replaced by an equally strong regard for the type of fire given by coke or semi-coke. The sentimental regard for the coal fire which is undeniably powerful must not be ignored, but rather must be always borne in mind when these problems are being considered. Not only must a smokeless solid fuel be available which gives perfect satisfaction in every way, but there must be, for perhaps the majority, an added incentive to create the effort which is needed to relinquish the old habit and adapt the mind towards a new one. Such an incentive will exist when there is a strong public opinion against smoke so that—as I said in the paper—"it will be considered to be socially wrong for smoke to be emitted, just as to-day the disposal of kitchen refuse by throwing it into the road is unthinkable by any respectable household."

To create this opinion is, perhaps, the main task of the National Smoke Abatement Society, and because we feel that it is enterprise which is of direct value to the Gas Industry, we are grateful for your suggestion that encouragement should be given to us. If our work were supported in the way that other propaganda has been supported there is but little doubt that success could be achieved.

ARNOLD MARSH,
General Secretary.

National Smoke Abatement Society,
71, Eccleston Square, S.W. 1,
May 4, 1931.

NOTES ON NEW BOOKS

REDGRAVE'S FACTORY ACTS (FOURTEENTH EDITION).*

During the six years which have elapsed since the previous edition of this work was published there has been a marked increase in the number and scope of the Codes of Regulations and Welfare Orders which apply to industrial processes. There is a considerable increase in the size of this fourteenth edition, and in order to facilitate use, a re-arrangement of the Acts, Regulations, and Orders has been made.

The work commences with an alphabetical table of cases, followed by an introduction to the Factory Acts. These Acts apply to "factories" and "workshops," and the only short way of defining the difference between the two is to say that a place where a manufacturing process is carried on is a factory if mechanical power is used, and a workshop if it is not; but it is remarked that this is by no means universally accurate. Part I. of the book then goes on to deal with the Factory and Workshop and kindred Acts, including the Workmen's Compensation Acts of 1923 and 1925. Part II. embraces Truck and Shop Acts and Shop Regulations, while Part III. includes Regulations, Welfare Orders, and By-laws. The final section, Part IV., is devoted to miscellaneous Acts affecting persons employed in factories and workshops, including various Education Acts and Public Health Acts.

The Codes of Regulations and Welfare Orders now appear in alphabetical order of trades, and throughout the work a note has been made wherever the use of a particular official form is required. The various alterations made in this edition, coupled with a comprehensive index, should enable any desired information to be easily and rapidly found.

* Redgrave's Factory Acts (Fourteenth Edition), 1931, by Joseph Owner, Barrister-at-Law. Published by Butterworth & Co., Ltd., Bell Yard, Temple Bar, at 21s. net.

FORTHCOMING ENGAGEMENTS

May 19.—SOCIETY OF BRITISH GAS INDUSTRIES.—Annual General Meeting in London, under the Presidency of the Right Hon. Lord Eustace Percy, M.P. Council Meeting in the morning.
May 20.—BRITISH COMMERCIAL GAS ASSOCIATION.—Meeting of General Committee, 2.30 p.m.
May 21.—MIDLAND ASSOCIATION.—Meeting at Wellington.
May 21.—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION.—Annual Meeting in Cardiff.
May 28.—SOUTHERN ASSOCIATION (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1.
June 2-4.—INSTITUTION OF GAS ENGINEERS.—London Conference.
June 3.—ASSOCIATION OF STATUTORY INSPECTORS OF GAS METERS.—Annual Meeting at the County Hall, Westminster Bridge, 10.15.
June 20.—LONDON AND SOUTHERN DISTRICT JUNIORS.—Summer visit to Isle of Thanet Gas Light and Coke Company, Margate.
June 26.—WAVERLEY ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Edinburgh.
June 30.—NATIONAL GAS COUNCIL.—Thirteenth Annual General Meeting.
June 30.—FEDERATION OF GAS EMPLOYERS.—Annual Meeting.
Sept. 10.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Rothesay.
Sept. 28-30.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at Exeter.
Oct. 27-28.—INSTITUTION OF GAS ENGINEERS.—Autumnal Research Meeting.

PERSONAL

MR. WILKINSON RESIGNS.

At a meeting of the Nottingham Corporation Gas Committee on Friday last, at which Councillor R. E. Ashworth, Sheriff of the City and Vice-Chairman of the Committee, presided, in the absence of Alderman Sir Albert Ball, a communication was read from Mr. John Wilkinson tendering his resignation, and the Town Clerk (Mr. W. J. Board) was instructed to cause advertisements to be issued inviting applications for the post of Engineer and General Manager of the undertaking. Thus the City loses the services of one who has worked unsparingly in its interests during a long and honourable official career.

NEW ENGINEER FOR DARWEN.

The Darwen Corporation have appointed Mr. A. F. Ames, Gas Engineer and Manager to the Oswaldtwistle District Council, to be their new Engineer and General Manager, at a salary of £600, rising by £25 per year to £700. Mr. Ames, aged 43, is a native of Church, and began his career in the Surveyor's Department. After three years he was appointed Assistant to the Gas Engineer, remaining for eight years. In May, 1916, he was appointed Engineer and Manager at Silsden, in Yorkshire, and during 2½ years there the manufacturing results proved to be the best obtained in the history of the works. The selling price of gas was 2s. 11½d. per 1000 c.ft. For six years he was Engineer and Manager at Padiham. Mr. Ames moved to Oswaldtwistle in January, 1925. Since then the works have been reconstructed and substantial profits made. Nearly £7000 has been allocated to the relief of rates within five years. Notwithstanding heavy capital expenditure, the consumers pay only 3s. per 1000 c.ft. There were 45 applicants for the position.

MR. F. C. TAYLOR'S JUBILEE.

Mr. F. C. Taylor, Manager, Engineer, and Secretary of the Shanklin Gas Company, completed fifty years' association with the Company on May 1.

A timepiece, with Westminster and Whittington chimes, presented him by the staff and employees, bears the following inscription: "Presented to Frank C. Taylor, M.Inst.Gas E., on the occasion of his 50th Anniversary as Engineer to the Shanklin Gas Company. With sincere congratulations from all members of his Staff and Employees. May 1, 1881—May 1, 1931." The presentation was made on behalf of the subscribers by Mr. L. Payne, and, needless ot say, it is a gift highly prized by Mr. Taylor.

A presentation was also made by the Directors of the Company to Mr. Taylor. This took the form of a divan chair, with an inscribed plate affixed. The inscription on the plate was as follows: "To Frank C. Taylor, after 50 years. A good friend and able Manager, with sincere regards from the Directors of the Shanklin Gas Company, May 1, 1931."

Yet another gift was a handsome silver bowl from a number of his friends in London.

Mr. Taylor, by reason of his long association and active interest in gas undertakings, has made a wide circle of friends in all parts of the country, and May 1 witnessed the arrival of a host of letters and telegrams congratulating him upon attaining his jubilee.

Mr. Taylor's commencement with the Shanklin Gas Company was somewhat in the nature of an accident. He was apprenticed in 1869, as a lad, to the firm of Collins & Cullis, cathedral and church builders, Mr. Taylor being in the art metal and ironwork department. He continued in this profession for several years after completing his apprenticeship. Later, he spent a short time at Bath in the distribution department of the Bath Gas Company, and in 1881 was appointed to the Shanklin Gas Company with a view to re-organizing the works. Settling to his task in the wholehearted manner characteristic of the man, Mr. Taylor never looked back, and though his work at first was very uphill he succeeded in placing the Company on a firm basis. The growth of the undertaking during the half-century may be realized from the following statistics: In 1881 the capital of the Company was £7000 and the annual make of gas 5 million c.ft.; after 25 years, the capital was £22,000 and the annual make 30 millions; and at the present time the capital is £62,000 and the annual make 75 millions. A new retort house is now under construction.

MR. JAMES KENNEDY'S RECORD.

Mr. James Kennedy, who for the past 43 years has been Manager of the Greymouth Municipal Gas Department, New Zealand, has been concerned with gas-works for the greater part of his career. He arrived in New Zealand from London in 1876, and joined the Christchurch Gas Company, with which he remained for six years. He then entered the service of the Invercargill Gas Department for a similar period, and when in temporary charge of those works was appointed Manager by the Greymouth Gas Company.

Shortly after his arrival at Greymouth, Mr. Kennedy began using slack coals, which resulted in a large saving for the Company. Before this, although a portion of the slack was used in the coke ovens, thousands of tons were being washed into the Grey River.

About 31 years ago the Gas Company sold the gas-works to the Greymouth Borough Council, a clause in the agreement providing that Mr. Kennedy's services as Manager were to be retained. The works under the Gas Company's control paid well, and at the winding-up of the Company a large premium was paid by the Borough for the shares. The reserve fund, which had been steadily built up for reconstruction purposes, was also divided among the shareholders. However, the Greymouth Borough Council has had no reason to regret its purchase, for during its ownership of 31 years, after paying all interest charges and sinking funds, and carrying out many improvements at the works and extensions out of profits, large sums have been handed over annually for the relief of the rates.

Several members of Mr. Kennedy's family are engaged in gas business. One of his sons is Mr. Matt Kennedy, the General Manager and Secretary of the Wellington Gas Company. Another son, Mr. Frank Kennedy, has for several years past represented the firm of Messrs. West's Gas Improvement Company, Ltd., of Manchester, in the United States and Canada. A grandson is a student of Gas Engineering at Manchester.

OBITUARY

WALTER R. ADDICKS.

We learn with regret that Mr. Walter Robarts Addicks, Senior Vice-President of the Consolidated Gas Company of New York, and a member of the Board of Trustees and Executive Committee of that Company, died recently of pneumonia. Mr. Addicks' death occurred on the seventieth anniversary of his birth. He was a member of several of the boards of trustees of subsidiary companies of the Consolidated Gas Company of New York. The following account is taken from the "Gas Age-Record":

Mr. Addicks was born in Philadelphia on April 14, 1861. He attended the Episcopal Academy, Philadelphia, three years, and before graduation entered the United States Naval Academy, Annapolis, Md., Engineer Corps, graduating in the class of 1882. Mr. Addicks resigned from the navy in 1883, and became a draughtsman in the offices of the Pennsylvania Railroad at Altoona, Pa., designing locomotives, cars, and shops. He became a surveyor of the railroad company's shops and shop-yards east of Pittsburgh and Erie in 1885, and in 1887 he accepted the position as Engineer of the Beacon Construction Company, Boston, Mass. Mr. Addicks designed and built the Bay State gas plant in Boston, and became Chief Engineer of the Bay State, Boston, Roxbury, South Boston, and Dorchester Gas Companies in Boston, Mass.

Mr. Addicks' vast experience and qualifications as a gas engineer, which have brought recognition by the Gas Industry throughout America, led the officers and trustees of the Consolidated Gas Company of New York to open negotiations with Mr. Addicks, which resulted in his coming to New York in 1903 to accept the first Vice-Presidency of the Consolidated Gas Company and his election to the directorate of several of the subsidiary gas and electric companies of the Consolidated Gas Company's system. At the same time he was elected President of the Municipal Lighting Company on Aug. 6, 1906, a position he held until Aug. 5, 1913. Mr. Addicks was elected Senior Vice-President of the Consolidated Gas Company on Jan. 29, 1925, a position he held until his death.

Because of his keen interest in engineering, so far as it pertained to public utilities, he was President of the American Gas Institute, the forerunner of the present American Gas Association.

At the time of his death Mr. Addicks was Senior Vice-President and Trustee of the Consolidated Gas Company of New York, and a Director in the following Companies: United Electric Light & Power, Westchester Lighting, Northern Union Gas, Central Union Gas, New York and Queens Gas, Standard Gas Light Company of City of New York, National Coke and Coal, Bronx Gas and Electric.

THE NEWS OF THE WEEK

Painswick Gas-Works have recently been acquired by the Stroud Gas Light and Coke Company, who will supply gas from the latter town.

Dursley Gas Light and Coke Company, Ltd., are fitting up new showrooms, to be opened in about a month's time. With an imposing frontage in the centre of the town, the premises are already attracting considerable attention.

The Wales and Monmouthshire District Institution will hold their annual meeting in Cardiff on May 21. The President, Mr. Octavius Thomas, will take the chair, and, in addition to the Presidential Address, there will be a paper by Mr. B. J. Bell, of Cardiff, entitled "Notes on the Application of Gas for Trade and Industrial Purposes."

The Verein deutscher Ingenieure.—The annual meeting of this body, which will take place at Köln (Cologne) from June 27 to June 29, will take the form of a jubilee celebration. There will be eleven professional meetings, at which papers dealing with important questions of present-day engineering will be read and discussed.

Lectures on Physics in Industry are being held by the Institute of Physics, and in that to be held at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C. 2, on Tuesday, May 19, at 4.30 p.m., Mr. Alan E. L. Chorlton, M.Inst.C.E., will deal with the subject of "Physics in Relation to the Development of the Internal Combustion Engine."

Following the Resignation of Mr. A. Ames, Manager of the Oswaldtwistle Gas-Works, who has been appointed Manager at Darwen, the Oswaldtwistle Gas-Works Committee, on May 7, discussed the appointment of a successor. The present salary is £550, with an allowance of £25 for use of car. The Committee decided to advertise for an Engineer at a commencing salary of £350.

British Industries Fair Site.—It was announced in the House of Commons on May 11, by Mr. G. M. Gillett, Secretary to the Overseas Trade Department, in answer to a question by the Rt. Hon. Douglas Hacking, that a Committee has been appointed by the President of the Board of Trade to consider and report how permanent accommodation for the London Section of the British Industries Fair could be provided and financed on a self-supporting basis, and to formulate definite proposals. Sir Gilbert Garnsey, K.B.E., is Chairman of the Committee, and the Secretary is Mr. G. H. Meadmore, Department of Overseas Trade, 35, Old Queen Street, London, S.W. 1, to whom all communications should be addressed.

Montevideo Gas and Dry Dock Company.—The Directors' report to be presented to the fifty-ninth ordinary general meeting at the Offices of the Company, 321, Dashwood House, Old Broad Street, E.C., on May 10, shows that after providing for interest on the debenture stocks, 6 p.ct. debenture stock redemption, and other charges, transferring £15,500 to exchange reserve and £2500 to general reserve, there is a balance at net revenue account of £58,003, including the sum of £22,766 brought forward from the previous year. An interim dividend of 3 p.ct., free of tax, has been paid for the half-year to June 30, and the Directors now recommend the payment of a final dividend of 3 p.ct., free of tax, making 6 p.ct. for the year, and leaving a balance of £17,503 to be carried forward to the next account. The reduction in the dividend is due entirely to the depreciation in the sterling value of the Uruguayan dollar. Compared with the previous year, gas sales show an increase of 10·33 p.ct., while the number of meters in use has increased by 8·07 p.ct.

Sixteen Veterans of the Gas Industry, whose combined ages total 1040 years, retire on pensions this week from service with the South Metropolitan Gas Company. The total years of service of these men is more than 500 years. They include fitters, plumbers, porters, labourers, greasers, and meter-makers. All the sixteen are members of the co-partnership scheme founded by the late Sir George Livesey, and a life pension on retirement is one of the many advantages which membership of the scheme secures.

Bradford's Gas Street Lighting.

The Bradford Corporation Finance and General Purposes Committee (which is the full Council-in-Committee) have accepted the offer of the Gas Committee in respect of maintenance of present and future street lighting, as follows: 2-burner lamps, £4 5s. per annum; 3-burner lamps, £4 15s. per annum; 4-burner lamps, £5 5s. per annum; 6-burner lamps, £6 5s. per annum; high-pressure lamps, £12 per annum.

This offer of maintenance is subject to (1) reduction or increase in the charges by 1 p.ct. for every 1d. per 1000 c.ft. by which the basic price of gas may fall or rise; (2) all roads in the city other than tramway or trackless trolley routes to be lighted by gas if in an area supplied by the Corporation with gas; (3) permission to the Gas Committee to modernize the lighting of all secondary roads at present gas-lighted, in the manner proposed in a report dated Aug. 26, 1930 (recently mentioned in the "JOURNAL"), and to equip with clock control such other existing lamps as they consider desirable; and (4) all new equipment required to be purchased by the Gas Department, without charge to the Finance Committee. Should an alternative system of street lighting be substituted for gas by the Committee in charge of street lighting, such new equipment as is replaced by the substitution shall be taken over from the Gas Department at an agreed valuation.

Electricity Application Turned Down.

At a meeting of the Sowerby District Council last week, the Gas Committee reported a letter from the Electrical Distribution of Yorkshire, Ltd., stating that they had received inquiries for domestic supplies of electricity from various houses in the old Sowerby district beyond Steep Lane to Moor Edge. As the houses were fairly scattered and the applications rather few, they desired to know if the Council would be prepared to consider the lighting of these roads with electricity, as some encouragement towards the development of this district. After considering the matter it was proposed by Councillor Foster, seconded by Councillor Lum, and carried, "That the Clerk be instructed to reply stating that having regard to the fact that this Council are producers and distributors of gas they are not prepared to consider the lighting of the roads referred to with electricity."

Councillor J. W. Whiteley, Chairman of the Sowerby Gas Committee, commenting upon this decision, said that the Committee replied in this way because they had in view a forward policy of supplying gas in the rural areas in the manner that Harrogate and Sheffield had done. This had been very successful, and he thought Sowerby Bridge could extend in such a way. Harrogate had carried their gas a distance of 17 miles and distributed it in small hamlets in rural areas. At Sowerby Bridge they had no intention of adopting a dog-in-the-manger policy, but they could not see their way to pay for street lighting by electricity when they were producers of gas themselves. If the other gas companies would show a little enterprise and would go into the question in the same way that they wished their Committee would go into it, they would have a better chance of getting some of the antiquated Gas Acts repealed or amended so that gas companies and gas authorities would have the same chances and facilities as had the electrical distributors.

New Gas-Works at Richmond (Yorks).

One of the largest schemes in which the Richmond (Yorks) Corporation have ever been interested will, we understand from the "North Mail," be begun in the near future.

"This scheme, which has also greatly interested the military authorities, relates to the gas undertaking, and has probably arisen as the result of a demand for gas by many people living in the garrison at Catterick.

"The garrison has its own electric power station from which Richmond and district secure their supply, but now the need for gas for cooking is being emphasized in this growing military centre.

"It is learned that a site near Easby, close to the railway between the Richmond and Catterick Bridge Stations, is considered a favourable site for the erection of new gas-works, and it is known that this land has already been surveyed.

"New railway sidings are also contemplated which, in the event of these new works being constructed, will considerably reduce the expense for the cartage of coal. In all probability this scheme will determine the end of the present Richmond works near the River Swale."

Imperial Continental Gas Association.

The following is the Directors' Report upon the trading results of the Imperial Continental Gas Association for the 107th year of its commercial activity, ended March 31, 1931:

Despite the general economic depression, the total consumption of gas and electricity in the areas supplied by the Association, or by the companies in which it is interested, continues to increase. Prolongations and revisions of various contracts for the supply of gas and electricity have been obtained. Business in the areas still directly exploited by the Association in Holland, Czecho-Slovakia, and Belgium continues to be satisfactory.

As the result of the offer of new stock to the proprietors, the paid-up capital of the Association has been increased from £2,436,594 on March 31, 1930, to £2,800,000. The audited statement of accounts for the twelve months to March 31, 1931, shows that, after deducting management expenses, pension charges, and income-tax, the balance to the credit of profit and loss account was £552,084, which, added to balance brought forward of £323,083, makes a total available for appropriation amounting to £875,168. Out of this balance there has been paid on the increased capital of £2,800,000 an interim dividend of 7½ p.ct., less income-tax at 4s. 6d. in the £. The Directors now recommend: (*a*) The payment of a final dividend of 12½ p.ct., less income-tax, making 20 p.ct. for the year; (*b*) a profit-participating bonus to the staff of £4335, which absorb together £275,585, leaving a balance to be carried forward of £437,368.

No appropriation to the general and specific reserves of the Association is proposed, as substantial appropriations have already been made during the financial year by the associated companies.

Satisfactory Year at Haywards Heath.

A satisfactory state of affairs was revealed at the annual meeting of the Haywards Heath District Gas Company held at the offices on April 23—Mr. EDWARD C. CHARLETON (Chairman of Directors) presiding.

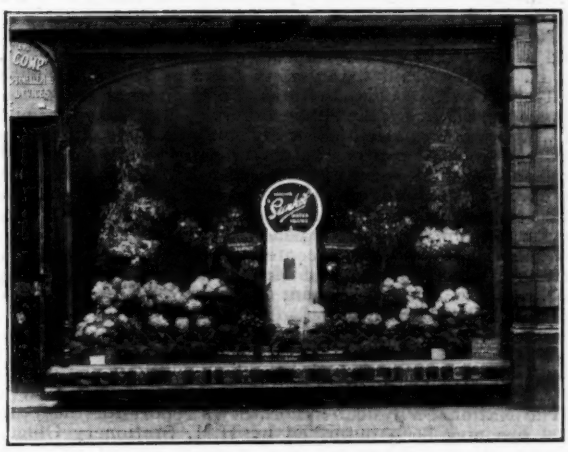
Moving the adoption of the report and accounts, the Chairman said: The statement of capital, both stock and loan, remains the same as at this time last year, but the capital account itself shows that we are overspent to the extent of £9275, to which point I shall refer later on. In the revenue account there are not many items to which it is necessary to call attention, though the item "repairs and maintenance of works and plant" is £800 more than last year. There has been an increase in the quantity of coal carbonized to the extent of some 300 tons, and in the sale of gas amounting to rather over 5 million c.ft.—an increase of 4·58 p.ct. Although there has been a larger output of gas and an increased turnover in every branch of our business, wages have not gone up, which is a satisfactory feature. This has been caused owing to close attention to labour on the works. In many cases this year Gas Companies have shown a decrease in their sales, so the advance to which I have alluded above is a gratifying feature. Indeed there has been an increase in our sales of gas every year for the last twelve years, with the exception of 1926, the year of the coal strike. Sales of coke are up, and we have done as well as most companies as regards our sales of tar. Mr. Charleton formally moved that the draft report, statement of accounts and audited balance-sheet for the year ended Dec. 31, 1930, be received and adopted, and that a dividend at the rate of 10 p.ct. per annum, making 9 p.ct. (less income-tax) for the year, be paid for the half-year so ended.

Mr. Fooks seconded, and the motion was carried.

Mr. R. S. Tobey (Auditor) quoted statistics showing the enormous increase in the output of the Company during the last 35 years. In 1895 the sale of gas was 12,289,000 c.ft. and in 1930 121,055,400 c.ft. In the same period the number of consumers had increased from 251 to 3478, while the number of gas cookers had increased from eight to 3792.

A "Sunhot" Window Display.

"Spring—the season of change; change now to a 'Sunhot' and keep the kitchen cool and free from dust during the summer" is the idea underlying an attractive window display at the Queen Victoria Street showrooms of Messrs. John Wright & Co. (Radiation Limited, Proprietors).



Symbolic of the season of the year, the window is filled with a beautiful display of flowers in the centre of which stands a 20-gallon size "Sunhot" storage heater in yellow enamel finish. Showcards round the apparatus set forth its advantages, stating the various sizes in which it can be obtained. Altogether a very striking display, and one which seems to be attracting a considerable amount of public interest, judging by the number of people congregating round the window.

British Tube Association.

The inevitable tendency of rationalization in industry has resulted, in one particular sphere, in the re-organization of the British Tube Association—a combination of most of the important manufacturers of wrought-iron and steel tubes and fittings in this country. Pooled resources—and this applies to manufacture, marketing, and research—is the order of the day; and there is every indication that the working of the British Tube Association, with its aim of better and more uniform products, to specification, at more attractive prices, and of better service to the Gas Industry, will do much good not only for gas undertakings but for British manufacturers in this field.

Certainly the latest move of the Association is on the right lines, for it is an immediate reduction of prices to their customers. There is, indeed, every reason for anticipating real and lasting benefits from the pooling of the experiences of the constituent firms of this important Association.

Meter Testing in Birmingham.

The annual report of the City of Birmingham Gas Meter Testing Committee states that 82,272 meters were tested during the year, as compared with 107,760 in the previous year, the decrease being attributed to the non-recurring activity of the Birmingham Gas Department in installing gas in small tenement properties not previously supplied, which last year accounted for 17,000 meters, and to the reduction in house-building programmes throughout the country.

The general efficiency of the Department was main-

THE NEWS—*continued.*

tained, and the reasonable requirements of the manufacturers of meters and of the local authorities of the surrounding district were being fully met. During the past year two additional outside authorities sent their meters to Birmingham for testing, and special arrangements had been made for the delivery, testing, and collection of the meters on the same day. The income during the year amounted to £5074, and there was a contribution to the rates of £1349. A statistical table showed that 2783 meters or 3·3 p.ct. were rejected, as against 2·95 p.ct. last year. Of 4561 wet meters tested, 153 were rejected, and of 77,711 dry meters tested, 2630 were incorrect.

No Labour Troubles During Forty Years of Profit-Sharing.

Employers and workpeople, representing firms in all parts of the country, in which co-partnership schemes are in operation, were present on Tuesday, May 5, at a conference held at the Co-partnership Institute, East Greenwich, under the chairmanship of Mr. F. McLeod, Director of the South Metropolitan Gas Company.

The profit-sharing schemes of three firms were described, and a discussion on the respective benefits followed. Mr. A. H. Andrews said that part of the scheme of the South Metropolitan Gas Company was the election of three employee Directors by the 8000 workers of the Company, one of whom was a salaried officer and the other two employees earning weekly wages. He said that since the original scheme was introduced by Sir George Livesey in 1889, the Company had been entirely free from labour troubles. The scheme, he added, included superannuation, pension, health, and unemployment benefit funds.

Other speakers at the conference included Mr. A. J. Jenkins, Works Manager of Messrs. Samuel Jones & Co., Ltd., and Mr. Alan R. Colman, a Director of Messrs. J. & J. Colman, Ltd., of Norwich.

Work of the N.P.L. in 1930.

The National Physical Laboratory's report for the year 1930 has now been published by H.M. Stationery Office, Adastral House, Kingsway, W.C. 2, price 12s. 6d. net; and it indicates the vast scope and value of the investigations undertaken in all sections of the Laboratory.

Without going into any detail here, reference may be made to three pieces of research which have a bearing on our Industry. The first concerns chains and lifting gear. At the request of the Home Office, experiments have been in progress since 1924 relating to the strength of wrought-iron and steel chains and lifting gear, the conditions which may give rise in practice to weakness and risk of failure, and the effects of periodic heat treatment, annealing or normalizing, which may be adopted to restore the material to a satisfactory condition. A report on the earlier work was presented in 1928 to the Institution of Mechanical Engineers, when the results obtained in the Laboratory investigation were very fully discussed, and the conclusions reached generally accepted. The report recommended low-temperature annealing at 650° C. as the best treatment for removing surface embrittlement in wrought-iron chains and for restoring the chains to a satisfactory condition for use. Early in 1930, a report was received from a Sub-Committee of the Sheffield and District Engineering Trades Employers' Federation, in which some further questions were raised, especially with regard to the temperature of annealing, and at the request of the Home Office a conference of makers and users of chains and lifting gear was called together at the Department of Scientific and Industrial Research. The Conference confirmed the conclusions reached by the Laboratory as to the treatment of wrought-iron chains. Further investigation is now in progress relating to mild-steel fittings, screwed shackles, and other lifting gear accessories.

The Laboratory has collaborated with the Standardization of Tar Products Tests Committee in the preparation of specifications for glassware and hydrometers to be used for tests on tar and its products, and in this connection a series of experiments has been made with a view to specifying suitable hydrometers for this purpose, which included the determination of the surface tensions of twenty-six representative samples of tar and tar distillates. A certain amount of volumetric glassware and other apparatus to the specifications prepared has been received for test during the year.

Regarding road research, the Ministry of Transport has now an experimental station at Harmondsworth in operation, to which much of the work formerly carried out by the Laboratory has been transferred. The experiments on skidding have thus been brought to a conclusion during 1930; the apparatus devised by the National Physical Laboratory staff for the skidding experiments has been handed over to the Harmondsworth laboratory.

Many of our readers will also be interested in the account of the work on photometry and on special steels for high-temperature work.

Revised Scale of Charges at Leeds.

In the "JOURNAL" for April 29, p. 271, we gave an outline of the new scale of charges which was approved by the Gas Committee at their meeting on April 22. The scheme came before the City Council on May 6, and was adopted by a good majority.

Presenting the report for the Gas Committee, the Chairman (Major Kitson) reminded the Council that two months ago, at their request, he withdrew a scheme which had been prepared at that time, to see if some modifications could be made, or some improvements effected. The foremost object of the new scheme was to place the Department on a better economic basis by offering gas at more attractive prices to potential consumers, with a view to increasing output, and with a view to making an endeavour to avoid any further drop in production, which has been the tendency in the last two or three years.

The criticism which the Council offered on the previous suggested scheme had, he said, been very valuable, and he believed the new scheme to be a great improvement from every point of view, more especially as it inflicted a much smaller increased charge on the small consumers than did the other scheme—the greatest increase being 1s. 6d. per quarter per consumer. Briefly the basis of the scheme was to introduce a small charge on every consumer to go towards the cost of service, collection of accounts, &c., and this would be based on the size of the meter used. To introduce such a scheme would be to bring Leeds much more into line with the modern practice of charging for gas, and in no way could it be said that such a charge was the exception rather than the rule, since 72 p.ct. of the municipal undertakings, and more than 90 p.ct. of the gas companies in this country made some such charge; and on the Continent in Germany alone 75 p.ct. of the gas undertakings there made a service charge, or charged a meter rent. In doing this they proposed to use the bulk of such extra revenue to reduce the price of gas; and although the first 5000 c.ft. per quarter was to be charged at 3s. 9d. (the present price), after that very considerable reductions would take place.

The Department had set out some low rates for gas used for central heating. The advantages to the prospective consumers would be that gas would be obtainable at prices competitive with coke and oil, and the city would then be taking a further step in the direction of smoke abatement. The chief advantage to the Department, however, would be that each order it booked for gas for central heating would add a load which up to now it had never been able to obtain.

They must remember that in this undertaking they were dealing with consumers some of whom bought in wholesale quantities, and some in retail quantities. It was, therefore, unreasonable to expect that their commodity should be sold both to wholesale and to retail purchasers at practically the same rate; and he did not feel that the purchasers themselves, if they considered it for one moment, would really believe that it was sensible to do so.

The question of a rate-in-aid was somewhat fully discussed at the Council meeting when the other scheme was brought forward, but it was still quite clear that such a method of dealing with the deficit carried by the Department, although it would clear off the immediate debt, gave no encouragement to the consumers to place further business, and made no provision for the future. And he regarded it as an unsound financial move, since it only temporarily bolstered up the business. There was no merit in paying off an existing debt when further losses were estimated, unless at the same time steps were taken to avoid those future losses. The rate-in-aid penalized a number of people in the city who were not consumers of gas. It was true that in the past considerable moneys had been taken from the profits for the relief of rates; but if they looked at it from a business aspect, although the shareholders—namely, the ratepayers of the city—had received a share of the profits in the past, they could hardly be expected to produce further working capital in bad times. It was not a normal procedure for dealing with such a situation, and in many ways it seemed to him grossly unjust. Many industries in the country would be in a better state to-day if they were in the happy position of being able to take advantage of such a method. He believed that the scheme suggested was the most likely one to bring about better business results for the Department, and eventually cheapen gas for all consumers.

THE CASE FOR BENZOLE RECOVERY

Mr. Charles Cooper, M.Sc., sets out convincing arguments in favour of the re-institution of benzole recovery on gas-works, where carbonizing conditions permit of a reasonable quantity and quality of product

The following remarks have been put together as a general discussion of the possibilities of recovering benzole from town gas, and a rigid study of the economics cannot be expected within the limit of such an article. Ultimately, each works, with its special conditions, must be a separate study as regards the commercial possibilities of benzole production, but it has appeared to the writer for some time past that the subject was well worth reviving.

The general practice of benzole recovery will not be unfamiliar to gas engineers, particularly those who were operating horizontal retorts during the war period. The fact will also be quite familiar that practically all these plants have for different reasons been shut down following the cessation of the purchase of benzole for munitions supply. Now it must be admitted that very few of the benzole plants on small and medium works, particularly those which were put in to obtain benzole at any cost, would be workable under competitive conditions.

It must be realized, however, that there have been very important changes in benzole recovery technique since the war—in fact, partly in consequence thereof. Recently, also, the use of benzole as a motor fuel has been studied in very great detail, resulting in much information being available, which will allow of a greatly changed outlook on benzole production, as compared with (say) ten years ago. At the present time it is quite within reasonable possibility to prepare a product from vertical retort gas, and even from low-temperature gas, which can be made stable and satisfactory in use as a motor spirit. It must be admitted, of course, that the highest grades of benzole must still be produced by horizontal retort carbonizing conditions, as these alone will meet the recognized specification for motor benzole. A good case, however, could be made out for instituting, on behalf of the Gas Industry, a special study of spirit recovered from other carbonizing systems.

The reasons for the discontinuance of benzole production may, however, have been quite other than those connected with unsatisfactory or uneconomical plant. In many works it was recognized that the period of benzole recovery coincided with an increase in distribution troubles, and it was very natural that the two things should be directly connected in the minds of those responsible for dealing with them. With later study, however, of distribution difficulties, it is possible to indicate not only that the connection may have only been an indirect one, but also to suggest means whereby benzole recovery might be successfully and safely practised without the recurrence of these various difficulties.

The Basic Cost.

The fundamental figure which has to be looked at when this question is argued is naturally the cost per therm into holder. A gallon of benzole represents almost exactly 1·6 therms taken from the gas. It is not, however, the cost of 1·6 therms into the holder which we must necessarily accept as being the basic value of a gallon of benzole for sale as an illuminant.

For example, assume that it has been carefully established that the cost per therm into holder is 3d., and that a reasonable relationship exists between expected consumption and carbonizing capacity. If now the gas engineer is approached by a new customer who is willing to provide a load equivalent to 5 p.ct. or even 7 p.ct. of the present total thermal output, what terms can he be offered? If, further, this new customer is so accommodating that his supply can be cut off under any emergency arising among the other consumers, could he not be particularly favoured, even where carbonizing capacity is perhaps too low as compared with possible demand? This customer, moreover, would take delivery on the gas-works and would incur no storage or distribution charges.

The argument which would arise from such a case as the above would be as to how much of existing capital charges, or additional capital charges incurred by supplying him, would necessarily be chargeable against the thermal output sold. In the majority of works, it is safe to say that, given the above conditions, such a customer might be charged only with the difference between cost of coal and revenue from residuals, and only a nominal figure need be included for capital charge on carbonizing, washing, and purification plant.

The fact is, of course, that this new customer would not take gas, but only a constituent of the gas primarily made for the other customers. This, of course, affects the conditions to some extent.

The acceptance of this new load will necessarily alter the general working practice to some extent, as more coal must be carbonized, and yet only the same volume of gas of standard value must be sent out. Alternatively, the change of conditions might be met by altering the proportions of gas made on different manufacturing plant in the same works or undertaking. These details will be to consider in any particular case, and the balance-sheet of benzole recovery will probably be different in different undertakings, according to the availability of various means for making up the increased thermal load.

The cost per therm into holder is as low as 2·4d. in certain cases which are known to the writer. This corresponds to 500 B.Th.U. gas put into holder at a cost of 1s. per 1000 c.ft. Naturally the lower this figure is, the better will be the case which can be made for extracting benzole; but, as pointed out above, the fact of obtaining an increased load may justify charging the benzole plant with less than the average cost per therm into holder.

According to recently published analyses of gas companies' accounts, the net cost per therm of 48 works was 4·53d., and the difference between coal and residuals was 2·06d. These figures, however, cannot be used directly, for various reasons. They include works with all types of carbonizing systems and also blue and carburetted water gas plant. With regard, therefore, to the difference in cost between coal and residuals, this must always be regarded as a high figure, as practically every alternative to straight carbonization will result in less coke for sale, if not an increase in charges for gas-making material. Looking, therefore, at the net cost into holder, it is rather significant that, although this average is not a weighted average, taking account of the various sizes of undertakings, examination shows that if the undertakings are divided into groups according to their size, the average figure in each group is very close to the general average given.

It may be taken, therefore, that with all charges put against the cost per therm of benzole, this figure cannot exceed 4½d. per therm, and may, if local circumstances are clearly seen to justify it, be relieved of capital charges, labour charges, and even some maintenance charges, down to a possible minimum figure well below 2d. per therm.

We are now in a position to present a first rough balance-sheet for the manufacture of crude and rectified benzole.

Manufacturing Cost and Revenue.

It is probably the most representative case, if we assume a benzole production of 50,000 gallons crude per annum. This represents a recovery of a little over 2 gallons per ton of coal carbonized on 20,000 to 25,000 tons per annum. Many coals will, of course, yield much more than 2 gallons per ton, but we have in mind that the extraction of benzole is also to be used as a means of adjusting calorific value, and that the extraction of benzole to a high degree demands an increasing cost in proportion as the yield required is higher. The obtaining of 2 gallons per ton out of a possible three can easily be done with the minimum of plant and manufacturing cost.

Recovery of Crude Benzole (50,000 *Gallons per Annum*).

Cost of plant, tanks, and building, £1850.

	Pence per Gallon.
12½ p.ct. on £1850	1·11
Steam	1·13
Water	0·20
Labour and supervision	0·45
Oil replacement	0·20
	3·09d.

In the above table steam has been charged at 16d. per 1000 lbs. Where a large proportion of gas-works steam is made in waste-heat boilers, this is quite a conservative figure.

Labour and supervision on a crude benzole plant only is of the most nominal description. In the above table there have been actually allowed 4 hours per day, whereas on the average crude benzole plant it is doubtful whether the whole time spent including chemical analyses and loading of outgoing tanks needs to exceed more than half this amount.

With regard to the actual operation of the plant, a good lay-out combined with the necessary automatic controls for

various parts of the plant will make the quality of the product almost independent of direct supervision.

The present value of the benzole in the gas at inlet to holder is the debateable matter, but in a case considered by the writer it was finally fixed at 3·6d. per gallon of benzole. Even in this figure a certain proportion of capital and maintenance charges were included.

Thus the gross cost of obtaining 1 gallon of crude benzole was 6·69d. This may not look particularly attractive, but it must be recollected that the benzole so obtained is not quite what we were accustomed to deal with as crude benzole at one time. A product made in a modern benzole plant consists practically entirely of saleable hydrocarbons, and the loss in conversion to the rectified product is probably well under 10 p.c. In fact, there is actual production going on to-day of a motor spirit which does not demand a rectifying plant, the crude benzole being rendered fit for direct use by certain inexpensive additions.

Supposing, however, that the rectifying of the benzole has to be undertaken, the table would work out about as follows:

	d.
Capital charges, 12½ p.ct. on £1760	1·06
Steam	0·08
Acid, &c.	0·25
Water	0·004
Labour	0·45
	1·844d.

	d.
Cost of 1 gallon of crude benzole	6·69
Cost of rectifying " "	1·84
	8·53d.

Yield of saleable product . . . 0·9 gallon per gallon of crude benzole
Cost of producing 1 gallon of rectified benzole, 9·5d.
Selling price of rectified benzole 12d. to 16d.

The minimum profit given by the above is quite a reasonable yield, and, to obtain it, it would probably not be necessary to sell retail.

Naphthalene Recovery.

In the above tables it may occur to the reader that the first cost for benzole recovery plant is rather small. As a matter of fact, there is a recovery washer required for which no allotment has been made in the above capital charges. Even if the figures were included for an appropriate washer, the cost of crude benzole would be raised by only 0·7d. per gallon, and of the rectified by 0·8d. per gallon. We shall, however, justify the omission of this figure as follows:

Practically all gas-making systems demand the use of naphthalene removal plant in order to give freedom from district troubles. In fact, practically all works now have a naphthalene washer on any gas stream which is capable of making a saleable benzole by scrubbing. (Even in the most modern system of benzole absorption—that by means of active carbon—it is specifically demanded that the gas shall be substantially naphthalene free before entering the benzole absorbing vessel.)

To justify this position, it will be necessary, of course, to guarantee that the position of the undertaking with regard to naphthalene recovery shall not be worse after the institution of benzole recovery than it was before. This can nowadays be fully guaranteed, and the best system of benzole recovery plants not only make a high grade and saleable benzole on the one hand, but strip the gas completely of naphthalene and recover this in a separate fraction.

The writer has constructed a gas oil recovery plant for users of naphthalene washers, which is in effect a specially designed benzole plant which will strip the gas oil, recover the benzole and naphthalene in separate fractions, and return the oil to the washer. The institution of this double fraction distillation has not been found in practice to cause any increase in supervision, owing to the excellent thermostatic and other controls which are now obtainable from instrument firms.

There may be some doubt as to the efficiency of an ordinary naphthalene washer for the purpose of removing benzole in quantity from rich gas. As a matter of fact, there need be no anxiety on this point, because, as mentioned above, it would not probably be economical to attempt a high proportion of removal of benzole—say, over 90 p.ct.—from the gas, in the majority of cases. The washer now employed for naphthalene removal will probably be quite equal to obtaining over 80 p.ct. of the benzole, the whole of the naphthalene, and practically all of the heavier hydrocarbons in the gas, at a single operation.

The principle of separating the benzole as a high-percentage distillation fraction, and the naphthalene and heavier hydrocarbons separately, is of considerable interest. Recent study of the formation of hard gums and resins in distribution systems has pointed to the parent substances being heavy hydrocarbons existing originally as vapour in the gas, which by polymerization and oxidation are rendered non-volatile and deposit on any surfaces available. Where such surfaces are the narrow openings of valves, by-passes, governors, &c., they are quickly brought into notice by their causing sticking and choking.

By direct experiment it is shown that these heavy hydrocarbons can be effectively removed along with the naphthalene by making suitable dispositions in the benzole recovery plant or gas oil regeneration plant, according as it may be viewed. Already some indications have been given that the full and complete removal of all the heavy hydrocarbons, even if the benzole fraction is left in the gas, will give relief in regard to the formation of these gums, and it is hoped that it may be demonstrated that gum formation will be entirely prevented.

These features of benzole recovery have naturally only been studied somewhat recently, and could not be used as effective arguments for benzole removal some years ago when existing plant was falling out of use.

Calorific Value.

It is interesting to note that benzole removal may have also an indirect effect in improving service conditions, as follows:

Suppose that the removal of benzole had resulted in a drop in calorific value of the gas of 5 p.ct., or 25 B.Th.U. In general, in this case the works will then send out a gas containing 5 p.ct. less inerts. In most cases this will also mean that the gas will go out containing a smaller proportion of oxygen. The investigation on gums has also indicated that the final stage of gum formation is undoubtedly oxidation by means of the oxygen carried in a free form in the gas. If, therefore, gases which are practically oxygen free could be distributed, it is possible that most of the gum-forming compounds would, after polymerization, be found in the syphons in a liquid form, and not on surfaces in a solid form.

The adjustment of calorific value can always be made within 25 B.Th.U., by interrupting or modifying the rate of benzole absorption. Of course, the point, mentioned above, must not be overlooked, that the preferred method of adjustment might simply be a re-distribution of the load between different forms of carbonizing plant. For example, compensation might be obtained by reducing the steaming in an adjacent bed of vertical retorts, or even shutting-down a blue water gas plant.

It is interesting to consider the probable effect of working a benzole recovery plant on a stream of dehydrated gas, such as is now becoming familiar to gas engineers.

A considerable proportion of the cost of maintenance on benzole recovery plants is represented by corrosion in oil preheaters, benzole condensers, &c. Practically all this corrosion has, in the past, been associated with the presence of ammonia salts which have been trapped in the water contained in the oil, or in that condensed from the gas by cooling during its passage through the benzole washer. If the dehydrated condition can be obtained, even on a crude gas, there is no doubt that a considerable amount of deterioration of plant and even of wash-oil could be prevented.

Another minor advantage of the institution of benzole removal is the fact that it is always found that organic sulphur compounds are simultaneously taken up by the wash-oil, and passed into the recovered benzole. The proportion of organic sulphur which can thus be taken away is not very large and seldom exceeds one-fourth of that present. It has been calculated that in order to remove effectively the greater proportion of carbon disulphide from the gas, it would be necessary to circulate something between 30 and 40 gallons of wash-oil per 1000 c.ft. of gas—a prohibitive amount when compared with the benefit obtained. The incidental reduction of organic sulphur by one-fourth, however, should not be overlooked when the economics of benzole recovery are being considered.

Summarizing the arguments in favour of the re-institution of benzole recovery on gas-works, where carbonizing conditions permit of a reasonable quantity and quality of product, we have the following:

1. A definite increase in sales, employing substantially only existing plant and labour.
2. Additional plant and labour required for the recovery plant itself are well covered by the revenue obtained.
3. Complete naphthalene removal is procured by the benzole recovery plant.
4. An almost complete elimination of gum-forming constituents can be expected.
5. Calorific value adjustment is obtained without increasing inerts.

First International Gas Conference and 68th Annual General Meeting of the Institution of Gas Engineers

President: HAROLD E. COPP, M.Inst.C.E., M.Inst.Gas E.

PROVISIONAL PROGRAMME

Tuesday, June 2.

10. 0 a.m.	68th Annual General Meeting of the Institution of Gas Engineers . .	Great Hall, Institution of Civil Engineers
	Welcome to Representatives from Overseas	" "
	Presidential Address	" "
11. 0 am. to 12.15 p.m.	Mr. J. S. Thorman, M.Inst.Gas E. (London), on "Intermittent Vertical Chambers and Coal and Coke Handling Plant at Southall" . .	" "
12.30 p.m.	Photograph of 68th Annual General Meeting	St. James' Park
2.30 p.m. to 3.45 p.m.	Dr. H. Schütte (Bremen), Immediate Past-President, German Gas and Water Association, on "Problems of Modern Gas Distribution" . .	Great Hall
3.45 p.m. to 5. 0 p.m.	Mr. Alfred L. Holton, M.Inst.Gas E. (Manchester), on "The Semi-Direct Recovery of Ammonia in Gas-Works Practice and the Recovery of Tar Acids from Ammoniacal Liquor"	" "
4. 0 p.m.	Mrs. Harold E. Copp's "At Home" (Ladies)	Hyde Park Hotel, Knightsbridge, S.W. 1
9. 0 p.m. to 2. 0 a.m.	Reception and Dance	Park Lane Hotel, Piccadilly, W. 1

Wednesday, June 3

10. 0 a.m.	International Business and Addresses	Great Hall
11. 0 a.m. to 12.15 p.m.	Mr. Clifford E. Paige (New York), President, American Gas Association, on "The Gas Industry in America"	" "
12.30 p.m.	Photograph of First International Gas Conference	St. James' Park
2.15 p.m. to 6.30 p.m.	Ladies' Visit to Royal Botanic Gardens by Steam Launch (Tea obtainable in Gardens)	Kew
"	(*a*) Visit by Motor Coach to and Tea at the National Physical Laboratory	Teddington
	or	
"	(*b*) Visit by Motor Coach to and Tea (by invitation) at the Southall Works of the Gas Light and Coke Company	Southall
	or	
"	(*c*) Visit to the Gas Light and Coke Company and Tea (by invitation) at Watson House	Nine Elms Lane, S.W. 8
8. 0 p.m.	President's Dinner to the Council and Representatives from Overseas	Grosvenor House, Park Lane, W. 1
11. 0 p.m. to 12.30 a.m.	"London by Night" Motor Coach Tour, with special reference to Street Lighting	London

Thursday, June 4.

10. 0 a.m. to 11.15 a.m.	Dr. R. Lessing, M.Inst.Gas E., F.I.C. (London), on "Clean Coal in the Gas Industry"	Great Hall
11.15 a.m. to 12.30 p.m.	Mr. R. N. Webb, M.Inst.Gas E. (Leeds), on "An Experiment in Controlling Pressure Conditions within Coal-Gas Retorts" . . .	" "
12.45 p.m.	Council Luncheon to the President.	Hotel Victoria, Northumberland Avenue, W.C. 2
2.15 p.m. to 6.30 p.m.	Ladies' Visit by Motor Coach to Windsor Castle (Tea obtainable in Windsor)	Windsor
2.30 p.m. to 2.45 p.m.	General Meeting of the Benevolent Fund	Great Hall
2.45 p.m. to 4. 0 p.m.	Mr. J. Herbert Clegg, M.Inst.Gas E., A.M.I.Mech.E. (Burnley), on "The New Oswald Street Gas-Works of the Burnley Corporation" . . .	" "
4. 0 p.m. to 4.30 p.m.	Concluding Business of Conference and Meeting	" "

Friday, June 5.

SUSSEX TOUR (Brighton-Worthing-Arundel-Haywards Heath).—Victoria Station (9.30 a.m.) by Special Train to Brighton (10.30 a.m.); Lunch at Hotel Metropole, Brighton (12.30 p.m.); Brighton (2.15 p.m.) by Motor Coach *via* Worthing (2.45 p.m.) to Arundel (3.30 p.m.); Tea at Norfolk Hotel, Arundel, and Visit to Castle, Keep, Ducal Dairy, Grounds, and Lake; Arundel (5 45 p.m.) by Motor Coach to Haywards Heath (7 p.m.); Haywards Heath (7.10 p.m.) by Special Train to Victoria Station (8 p.m.). Distance: 135 miles. Members not desiring to journey to Worthing and Arundel may return from Brighton by any train after lunch or, on payment of a small supplement, on the following Tuesday night.

GAS EXHIBITION AT REDHILL - -

The East Surrey Gas Company, in co-operation with a number of appliance manufacturers, held a most successful gas exhibition in the Market Halls, Redhill, last week. The Mayor of Reigate performed the opening ceremony

An interesting exhibition of modern gas appliances was held last week by the East Surrey Gas Company, in co-operation with a number of manufacturers, at the Market Halls, Redhill. The opening ceremony was performed on Monday, May 4, by His Worship the Mayor of Reigate (Alderman Temple Newell, J.P., C.C.), who was supported by the Deputy Mayor (Alderman Malcomson), while the Chairman of the Company, Mr. W. Lees Stenning, presided.

Among those present were Mr. W. H. Bennett, Managing Director of the East Surrey Company, Mr. H. M. Thornton, Mr. C. G. Davis, Mr. F. W. Richmond, Mr. Ivon Yates, of Radiation Limited, Mr. A. Tennant, Sales Manager to the Company, and a number of prominent officials and residents from Redhill and Reigate.

In the course of a few introductory remarks, Mr. Lees Stenning said that one of the mottoes of the Borough was that Reigate welcomed progress—and the foreword of this exhibition was "Progress." It was an exhibition arranged to demonstrate the progress of one of the oldest industries in the country. For over 120 years, said the speaker, gas had been manufactured in this country for commercial and domestic purposes, and it had been used in Reigate for over 90 years. The Company's 15,000 consumers demonstrated that they were progressing alongside their confrères in the Industry. He then called upon the Mayor formally to declare the exhibition open.

The Mayor of Reigate said that the opening of the exhibition was an important matter in the Borough, and he

was glad to have the privilege of performing the ceremony. He would like to congratulate the promoters upon the very representative attendance, as well as upon the general excellence of the exhibition. The production of gas, he continued, was one of the oldest industries in the country and one in which a very great number of improvements and inventions had taken place, and the holding of this exhibition was evidence of the enterprise of the East Surrey Gas Company. There had for a long period now been a state of depression, and there had been difficulties and testing times alike for industry and commerce. It might truly be said that no industry had entirely escaped, and when industries were depressed on the production side, one might be quite sure that they were also depressed on the distribution side —generally called commerce. The fact was that men had become to a great extent the victims of the machinery they had created, and they had in no small way lost their freedom. On the other hand, machinery had undoubtedly to a great extent raised the standard of living, while it had also very largely eased manual toil in workshop, factory, home, and office, and so far as national life was concerned the Gas Industry, it might truly be said, had taken a leading part in bringing about those improvements. It had taken its share in improving the standard of living and in saving labour.

A Supplier of Many Public Needs.

The production of gas, he continued, was not one single industry, but the parent of a number of industries of importance which found their way into public utilization through several channels, including the engineer, the chemist, the farmer, and the manufacturer, while quite a large number came into ordinary domestic use. There was no doubt that people of this country were, as a whole, much better housed, fed, and clothed to-day than they were a hundred years ago, and this great Industry had played its part in the reform. It might claim that its development—which had been enormous—had been due to the fact that it supplied so many public needs. British names had been associated with the discovery of gas, and British names had been associated with its first practical application in the lighting of buildings something more than a century ago. It was very interesting to note the wonderful developments which had taken place during that period, the results of many of which they had before them at that exhibition, where they could see the best appliances of the Industry presented to them. In conclusion, he hoped that the exhibition would be a great success and would be of great benefit to the Borough, and he had much pleasure in declaring it open to the public.

Pioneers of Co-Partnership.

Mr. Lees Stenning, in thanking the Mayor for performing the opening ceremony, said the Gas Industry had been pioneers in the co-partnership movement, and it was their proud boast that it had been in operation in this Company for many years past, by which every benefit to the consumer was equally shared by those who provided the capital and those who provided the labour, to the advantage of both. They could not work separately, but they could work hand in hand, and the Gas Industry had led in this direction. They were indebted to the firms throughout the country through whose co-operation the exhibition had been brought to a successful opening that day. Gas was being shown in the most useful appliances for all domestic purposes. There would be cookery lectures each evening and each afternoon after that one. They were free, and the programmes contained every kind of cooking.

Finally, Mr. Lees Stenning said he would like to thank all those who had helped to prepare the exhibition, and he would like to say a word to the consumers present—that was from July 1 there would be a reduction in the price of gas and a graded reduction for large consumers. To the stockholders he would say " Do not sell your stock," for, in spite of the terrible state of stock exchange prices, gas stocks had held, and were likely to remain, firm.

Alderman Malcomson (the Deputy Mayor) complimented the Mayor on his address and for the wide view he had taken. The Mayor was Chairman of the Electricity Committee, and when the Chairman of an Electricity Committee came to open a gas exhibition it indicated that broad-mindedness which should be natural to them all. He also congratulated the Company on the great progress they had made during recent years; they had supplied very good gas, as the Corporation knew, for they tested it regularly. He hoped that the ladies present would take a fancy to particular pieces of apparatus, and that orders would flow in to the Company.

After the opening ceremony, tea was served in the hall which was subsequently utilized for the cookery demonstrations.

The Exhibits.

Almost the whole of the Market Halls, Redhill, was devoted to the exhibition. Upon entering through the main doorway, one was faced with the chemical section, where some of the many bye-products of the Gas Industry were displayed, including tar, drugs, chemicals, disinfectants, and fertilizers. In the entrance hall, also, was an example of an imitation log fire, which is, of course, actually a gas fire, in a tasteful old-world fireplace. Examples of large gas ranges and pastry ovens were also to be seen here. Leading off the entrance hall was an inquiry room in which were a number of coke boilers and a " Metro " fire, the latter in operation.

Modern Cooking Appliances.

On the main staircase leading up to the exhibition hall were further up-to-date gas appliances, chiefly cookers and hotplates, among which was the " Eureka New World " gas range, which is a very attractive piece of apparatus in " Rado " mottled enamel finish. This appliance should make a strong appeal to the user not only on account of its appearance, but also from a labour-saving standpoint. There are no bright parts to keep clean and polish; the " Regulo " head is nickel-plated, and the taps are chromium plated. A similar attractive range on view was the " Queensway New World," which incorporates the basic " New World " principles of single oven burner and direct bottom flue outlet, " Regulo " control, disc-bar hotplate, " Vertico " taps, and " Rado " boiling burners. Special features of this apparatus are the ample independently heated warming oven, with double doors, and the convenient plate rack and back plate. The finish is porcelain enamel as is also that of the oven interior. The oven shelves slide on embossed projections on the sides, thus entirely eliminating iron work supports and ensuring cleanliness.

Representative of the smaller types of cooker was the " Bungalow Minor " which has been specially designed for small households where accommodation is limited. The oven of this cooker is double-cased and packed to prevent the escape of heat, while the interior is lined with grey-mottled enamelled steel sheets. There is a thoroughly up-to-date hotplate fitted with the flame-spreading " Efficiency " burners.

Upon entering the main exhibition hall (in which the opening ceremony took place) one was immediately struck by the attractive way in which the appliances were set out, being sectionalized into their natural groups for kitchen, bathroom, living room, laundry, and refrigeration purposes. In the kitchen section was an up-to-date gas cooker and a " Sunhot " storage heater. The bathroom section was attractively finished in green porcelain, the gas equipment consisting of an " Equator " boiler, a " Celerity " instantaneous heater for the basin, and a gas-heated clothes airing cupboard. The " Celerity " heater is a very pleasing little apparatus in art gold finish, with a water flow at the rate of two quarts per minute, with a rise of 65° Fahr. over that of the cold supply. The heater is made up of a coil of four tubes fitted with patent solid webs for quick conduction of heat to the water passing through the coil. A cast outer casing is fitted to conserve and concentrate the heat on the coil, and the burner is of the double type fitted with gas and air regulators to ensure perfect combustion.

Cooling, Heating, and Lighting.

In the refrigeration section examples of " Electrolux " gas-operated units were exhibited, while in the laundry section demonstrations were in progress of gas ironing and clothes washing with a gas-operated wash-boiler, a gas drying cupboard completing the equipment. A number of modern gas fires were shown in appropriate settings at one end of the hall, these including the well-known " Sunbeam " in art bronze finish and the " Panella " inset fire which was described in the " Journal " for April 22 last (p. 218). A further range of cookers of various designs were also exhibited in the main hall.

The most up-to-date lighting fittings demonstrated very ably what gas can do in this direction. Pendant, bracket, panel, and standard lamps of attractive design served to illuminate very efficiently the various exhibits, while the operation of the " Newbridge " positive gas switch was demonstrated. The advantages of Vitreosil glassware for gas lighting purposes were shown by an installation at one end of the hall where cold water dripped continuously upon a Vitreosil globe attached to a lighting burner. Largely on account of its small coefficient of expansion Vitreosil may be subjected to rapid and extreme changes of temperature without danger of breakage.

On the walls of the hall were charts indicating the progress of the Gas Company during past years. During the course of the exhibition cookery lectures were held twice daily by Miss Kirkby, chief demonstrator to Messrs. Radiation Limited.

Production of Oil from Coal on Public Utility Lines - -

"The vicissitudes through which low-temperature carbonization and coal distillation have passed are far too well-known to require further comment, but at last it appears as if a concerted effort is to be made to establish the new industry"

By Harald Nielsen.

The basic industry of this country, the coal trade, is gradually getting into a more and more serious position. Last year the amount of coal which could be disposed of dropped by nearly 40 million tons, and unemployment in the mines is steadily increasing week by week. We cannot possibly hope to regain a profitable export trade by the passing of a resolution or the stroke of a pen. That it can ultimately be done, I firmly believe; but until that time we shall have to look round and see what can be done in this country to facilitate matters.

One of the most helpful outlets for coal is the Gas Industry. This great Industry consumes approximately 20 million tons of coal per annum. Can the Industry consume still more? This can be done by linking-up a low-temperature scheme to existing gas-works undertakings. From the announcement of Mr. Edwards, a Lord of the Treasury, in the House of Commons on May 5, it would appear that the Government are considering the situation very seriously, and they are prepared to grant help, financially and technically, through their established Departments.

The plight of the Navy, from the strategic point of view, regarding oil fuel was ventilated extensively by Commander Kenworthy in the Debate on the Navy Estimates, and the reply given by Mr. Hall, the Civil Lord of the Admiralty, as expressing the Government's attitude, makes good reading.

An Opportunity?

The gas undertakings have the chance of a lifetime. In years gone by they had an opportunity of initiating and absorbing the electrical undertakings, but they let that opportunity pass. Now we see the intense competition between these two great entities. Reading between the lines of Mr. Edwards' announcement it would seem that another opportunity is being presented to gas undertakings—that of being the producers of a home supply of oil.

Let us examine more closely the economic possibilities of linking a low-temperature distillation scheme to an existing gas-works for the production of Navy grade oil from bituminous coal, making efficient use of the low-temperature gas and producing various grades of good smokeless fuel, with the object of formulating a scheme of national importance to assist in rehabilitating the coal trade, in providing more work for the unemployed, and in finding remunerative markets for coal within the boundaries of the country. The following scheme on public utility lines is proposed.

It is suggested that clean, rough slack coal of a non-caking or medium-caking nature, having an ash content not exceeding 8 to 9 p.ct., a moisture content not exceeding 8 to 10 p.ct., and a volatile content not exceeding 28 to 32 p.ct., should be available at the low-temperature plant at a cost not exceeding 17s. 6d. per ton. This coal would be distilled in the largest possible single units in the cheapest and most efficient manner.

The object of the low-temperature treatment is to divide the coal substance into three main products—namely, solid, liquid, and gaseous. The solid product—that is, the residual smokeless fuel—with a volatile content of not less than 13 to 14 p.ct., should be screened so that approximately 30 p.ct. of the total is obtained in three or four standard grades, the lump fuel being suitable for domestic use, and the nuts and beans partly for domestic and partly for industrial use. The balance, amounting to two-thirds, should be subjected to a crushing treatment, if required, and then mixed with a pitch binder and passed through high-temperature gas retorts, so as to obtain carbonized low-volatile, highly reactive, and easily-combustible briquettes of ovoid or any other suitable shape.

From the combined plant there will thus be for disposal straight low-temperature smokeless fuel in various sizes required for general utility purposes, and high-temperature, low-volatile briquettes, which may be used partly for domestic and partly for industrial purposes.

The liquid products, or oils, which would be produced in a quantity corresponding to approximately 20 gallons per ton of raw coal treated, should be subjected to fractional distillation so as to obtain 60 p.ct. of the total oil to the Admiralty specification for Diesel and fuel oil, or to subsequent cracking or hydrogenation for petrol and motor spirit production. The balance, including distillation losses, would amount to 40 p.ct. The distillation losses would normally not exceed 4 to 5 p.ct. of the total oil. The 40 p.ct. we will designate as pitch, and this would be used as a binder for the briquetting of the solid residue.

Gaseous Products of Combined Plant.

The gaseous products from the combined process will be the following:

From the raw coal, by the low-temperature treatment, approximately 20 therms of high calorific value gas would be obtained. From the high-temperature treatment of the pitch-bound residual fuel or semi-coke briquettes, approximately 24 to 25 therms of high-temperature gas would be made, so that in all between 44 and 45 therms of standard grade town gas would be obtained on the basis of 1 ton of coal entering the low-temperature section of the combined plant. This gas, when mixed, will have a calorific value varying between 520 and 550 B.Th.U. per c.ft., and would be an ideal gas for domestic and industrial use, as well as for long-distance transmission.

The following is a balance-sheet on the basis of 1 ton of coal entering the combined process:

A. Residue produced per ton of raw coal from L.T. treatment: 0·65 ton

I. Screened material—straight L.T. smokeless fuel	= 0·195 ton	= 0·65 ton
II. Small fuel for briquetting	= 0·455 ,,	
8 p.ct. pitch binder	= 0·0364 ton	

By high-temperature treatment in ordinary gas retorts, leaving 3 to 4 p.ct. of volatile matter in the carbonized semi-coke briquettes, approximately 0·43 ton of carbonized briquettes is produced.

B. Oil produced per ton of raw coal: 20 gallons anhydrous oil, equivalent to 0·092 ton, yielding:

10 gallons of light Diesel and fuel oil to Admiralty specification, equal to	0·0445 ton
Pitch	0·0364 ,,
Motor spirit (crude) 1·8 gallons, equal to	0·0065 ,,
Loss in distillation and handling, 5 p.ct.	0·0046 ,,
Total	0·0920 ,,

C. I. Gas from L.T. section = 20 therms
II. Gas from H.T. section—carbonizing of briquettes = 24 ,,
Total 44 ,,

Mixed gas volume = approx. 8500 c.ft.
Cal. value per c.ft. = ,, 520 B.Th.U.

Outlay:

1 ton of raw clean slack	17·5 shillings
Cost of L.T. distillation, including labour, fuel, maintenance, depreciation, repairs, and power, per ton of coal	5·0 ,,
Briquetting costs of 0·455 ton residue	2·5 ,,
H.T. carbonizing costs of 0·49 ton of raw briquettes	3·0 ,,
Distillation costs of crude oil	1·7 ,,
Total outlay	29·7 shillings

Income:

Straight residual smokeless fuel at 25s. per ton at plant—0·195 ton	4·88 shillings
Carbonized briquettes at 30s. per ton at plant—0·42 ton	12·60 ,,
10 gallons of light Diesel or fuel oil at 3d.	2·50 ,,
1·8 gallons of crude motor spirit at 5d.	0·75 ,,
4 gallons of H.T. tar at 2d.	0·66 ,,
44 therms of gas at 3·5d. per therm	12·50 ,,
Total income	33·89 ,,

Credit balance per ton of coal: 33·89s. − 29·70s. = 4·19 shillings

The cost of the coal, bearing in mind its nature, might probably be considered on the high side, but it includes an allowance for transport charges over a reasonable distance. In all probability, in most cases this grade of coal could be obtained at a price which would not exceed 14s. 6d. to 15s. 6d. per ton delivered into the low-temperature plant bunkers. The operating costs of the L.T. plant, the briquetting costs, and the high-temperature distillation costs are based on available figures.

In the briquetting costs no allowance has been made for pitch, since the combined plant is self-supporting in that respect, and consequently no credit has been taken for the pitch on either side of the balance-sheet.

The value at which the gas is assessed—namely, 3·5d. per therm—is the production cost of the gas into the holders in some of the largest gas undertakings in the country. The

average cost of the gas for medium and smaller gas-works ranges between 3·5d. and 4·5d. per therm.

The value assessed to the light Diesel and fuel oil is approximately 55s. per ton *ex* works. The average current price quoted *ex* ocean ports is 60s.-66s. per ton.

The high-temperature tar, which is obtained by the carbonizing of the pitch-bound briquettes in the gas-works retorts, has been assessed at 2d. a gallon, which is to-day the average all-round price, *ex* works, for dehydrated tar.

The crude motor spirit price has been assessed at 5d. a gallon *ex* works; and in view of the high anti-knocking properties of this motor spirit, this price should be obtained, since crude benzole is quoted at about 7d. a gallon.

The values of the smokeless low-temperature residue and the high-temperature, highly-reactive carbonized briquettes have been somewhat difficult to assess, but the figures quoted are based on actual prices obtained at works for these grades, and compare favourably with the price *ex* works for graded and screened gas coke. It must also be remembered that we have here materials which would be universally applicable to all kinds of domestic heat appliances, be they open grates or closed stoves.

Making Use of Existing Plant.

The underlying idea of the complete scheme is to make use of existing plant in ordinary gas-works, as well as the storage, handling, and distributing facilities. It is the intention that this new solid fuel should take the place of domestic raw coal; and if considered weight for weight, and not taking into account the greater convenience and heating efficiency obtained by using the smokeless fuel, it will be realized that, for every ton of raw household coal used, approximately 1 ton of smokeless fuel would be substituted. Since, however, 1 ton of raw coal will only produce approximately 0·65 ton of smokeless fuel, 40 to 45 p.ct. more raw coal will have to be mined in order to satisfy the demand of the market. In view, however, of the greater efficiency of the smokeless fuel, the extra quantity of raw coal to be mined would in all probability be in the neighbourhood of 30 p.ct. That is to say, without displacing any existing market demands, 30 p.ct. more raw coal could find its way into the domestic fuel market.

We shall have therefore found an outlet for this increased coal output through existing channels; we shall produce an oil from raw coal which we know definitely can take the place of imported well oil products, thereby keeping an equivalent amount of money in the country and benefiting the coal industry by that amount; and we shall produce a high-grade town gas at the cost at which ordinary town gas is manufactured. And since under this scheme about 20 to 25 p.ct. less gas is produced per ton of raw coal, the Gas Industry would be able to absorb a correspondingly greater amount of coal from the pits without in any way disturbing the existing equilibrium or rendering the gas undertakings any less remunerative. It has been shown by experience that briquettes or non-agglomerating coals can be carbonized with considerably greater rapidity than smalls of a coking nature; consequently the existing high-temperature retorting plant will be able to deal with 10 to 15 p.ct. increase in weight of briquettes over raw coal without any additional retorting capacity being required.

New Gas Showrooms - - Opened at South Woodford

New Gas Light and Coke Company Showrooms were opened in George Lane, South Woodford, E. 18, on Tuesday, May 5, by Sir James Hawkey, J.P., Chairman of the Woodford U.D.C.

The twenty years that have elapsed since the opening of the original Gas Light and Coke Company showrooms and offices at Woodford have witnessed an increase of approximately 60 p.ct. in the number of consumers served by them. This resulted, naturally, in the position that the buildings had become inadequate for dealing with the increased and increasing volume of business, and the Directors accordingly decided that they should be replaced by new and up-to-date premises a few doors from the old building, at 137, George Lane, South Woodford.

The Opening Ceremony.

The opening ceremony was performed by Sir James Hawkey, J.P., Chairman of the Woodford Urban District Council, who was accompanied by Lady Hawkey, and was supported by Councillors, principal officers of the Woodford and Wanstead Urban District Councils, and prominent local residents, including members of the local Rotary Club. In the unavoidable absence of the Governor of the Gas Light and Coke Company, Sir David Milne-Watson, who had to attend an important meeting in London, the visitors were welcomed by the General Manager, Mr. Robert W. Foot, who presided at the opening ceremony. Also present were the Secretary (Mr. W. L. Galbraith), the Chief Engineer (Mr. Thomas Hardie), the Accountant (Mr. H. E. Ibbs), the Rental Superintendent (Mr. L. M. Simmons), and the Deputy Controller of Gas Sales (Mr. Stephen Lacey), together with senior officers of the Gas Sales Department, to which is entrusted the task of giving good service to the 1,250,000 consumers in the Company's area.

The visitors were entertained at tea, after which,

Mr. R. W. Foot, before asking Sir James Hawkey formally to declare the premises open, said that it was with great regret that the Governor had been prevented from attending, but he had been detained on urgent business on behalf of the Gas Industry. He was serving on a Government Committee on gas legislation, and although they were very sorry he was not present they felt that the work he was doing was very important and might have an effect on the legislation of their Industry. Although they felt they were suffering in some ways from legislation they in the Gas Light and Coke Company did not feel they were under any restrictions at all and were able to go on and do their business in the way it should be done—particularly in the direction of selling gas. This was shown by the fact that they built throughout their district showrooms such as these being opened on that occasion. These showrooms were designed in order to show consumers the very latest developments in gas apparatus, and to indicate that in these days gas could be used in many different ways by means of appliances which so far from detracting in any way from the appearance of the room or house in which they were utilized went a long way towards improving it. This was instanced by looking round the walls of the room in which they were seated at that moment, where they would see the latest thing in gas heaters, and that was the first occasion they had been displayed in public. (Mr. Foot was referring to the G.L.C. "Inducer" heater, a number of which were in operation in the room in question.) They were very pleased, continued Mr. Foot, to be able to show Sir James Hawkey this latest development in gas heating, and there should be a very considerable field for heaters of this kind.

These showrooms, with the stores at the back, were designed in order that the residents in the neighbourhood—and they had in this area close upon 8000 customers—might have a proper place in which to view gas appliances; and the Directors, when putting up these buildings, did not only concern themselves with what could be seen from the street, but saw that all parts of the premises were suitable for viewing the apparatus, while, in addition, every attention had been paid to the rooms which were to be used by the clerical staff and workmen, and the particular room they were in was not only to be utilized for cookery demonstrations, but also as a clubroom for the men when their day's work was done.

Sir James Hawkey said that they much regretted the absence of Sir David Milne-Watson, but were very glad to have with them the General Manager of the Company. On the occasion when he had previously opened premises, five or six years ago, for the Gas Light and Coke Company at Woodford Green, he had ventured to point out to Sir David Milne-Watson that it was evidence of his breadth of spirit to ask him to open the showrooms, because at that time he was trying to bring an electrical company into the area. Since then he had been closely associated with two or three electrical companies; but they all agreed that an industry to be healthy must have competition. Therefore he was there that day to wish them the very best in opening this building.

Free from Industrial Depression.

Continuing, Sir James Hawkey remarked that he did not believe that even to-day the use of gas in the home was properly realized. It was difficult to remember the days of the old-fashioned kitchener, and the times when all the family had to have a bath on one day of the week, and when the servants had to come down early to light the

fires. The Gas Industry had done a great deal to ease the lot of the average household. There was another matter on which he would like to congratulate them—and that was the fact that the Gas Industry along with the electrical industry and the building industry were the only ones which were not suffering severely from the general industrial depression. They were to be congratulated on that favourable position. In formally declaring the new premises open to the public, he took the opportunity of congratulating the architect, through whom they had carried on the traditions of Woodford Green. Wherever the Company went in that area, so long as they had Mr. Walter Tapper as their architect, they would be welcome.

Mr. F. Bonallack (Chairman of the Wanstead Urban District Council) proposed a vote of thanks to the Gas Light and Coke Company for having invited them there on that occasion and for having treated them so well. They fully appreciated the efforts the Company were putting forth, and one could not but be astounded at the wonderful way in which the Company handled their affairs, especially in connection with social welfare of their staff, from the time a boy entered the service of the Company until his retirement.

Mr. Foot, acknowledging the last speaker's remarks, said that Mr. Bonallack had touched upon a point in which the Company were extremely interested—social welfare. They took a particular interest in the boys when they entered the service of the Company and endeavoured to bring them up in the way they should in order to make them into good citizens. They were very pleased to have so many representatives of the local authorities there that afternoon. The Company had a great deal to do with the local authorities in the course of their work, and they felt that in this district they were on the cordial terms they liked to be with the authorities. In conclusion, Mr. Foot thanked Sir James for performing the opening ceremony.

Description of Premises.

The new showrooms and offices occupy a prominent position in George Lane, the busy shopping centre of South Woodford, and it is hoped that they will give improved service to the 8000 consumers residing in Woodford and Wanstead. It is interesting to note that the number of callers at the existing showrooms in 1930 was over 20,000.

The district is a residential one and is developing very rapidly. About 1000 houses have been erected in the Woodford and Wanstead area within the last ten years, and further building schemes, comprising about 500 houses in all, are shortly to be commenced.

The new showrooms and offices are the work of Mr. Walter Tapper, A.R.A., F.R.I.B.A. In a two-storeyed building, the ground floor is devoted to the display of apparatus and a wide selection will always be on view there in surroundings designed to assist the customer's choice as much as possible.

The first section entered from the street is devoted mainly to a display of up-to-date gas fires, with two examples of gas cooker and storage heater for the kitchen. Passing through to the next section one is faced with a splendid display of cookers of all types from the high-grade mottled enamel finish to the cheaper but none the less efficient "hire" type. In this section also is an example of gas-operated refrigerator and further storage heaters. Leaving this section one comes to a further range of gas fires and a gas-ignited coke fire, and also various small gas appliances such as irons, fittings, &c., for different purposes. The counter for the payment of accounts is reached by walking right through the showrooms, and close to the counter are a number of further appliances, including a coke boiler, gas washing machine, and a number of attractive cookers in mottled enamel finish. The last section consists of a bathroom display, including geyser and storage heater for the bath, a small instantaneous heater for the basin, and a gas heated linen cupboard. The lighting fittings displayed are varied and attractive, examples of switch control being in evidence.

On the first floor are situated the offices where the Inspector's staff carry out the clerical work connected with the district. A comfortable demonstration room has also been provided, which will supply a long-felt need. Here housewives and others in the George Lane district will be able to benefit by the cookery lectures and demonstrations which have proved such a popular feature at other of the Company's offices.

The main building is backed by a yard, and across the yard are the stores and foremen's offices, designed by Mr. Austen Hall, F.R.I.B.A., to house the Company's outdoor staff and the apparatus and materials essential to their work. The building contract was carried out by Messrs. Chinchen & Co., of Harlesden.

NOTES ON PLANT AND PROCESSES

"Corflex" Flexible Tubing.

The increasing popularity of portable appliances in the past few years has drawn greater attention to the need for a thoroughly satisfactory and reliable flexible tubing. Although all-metal tubing is available its price is prohibitive for normal purposes, while the so-called flexible metallic tubing relies upon a length of rubber or other packing in a seam approximately ten times the length of the tubing itself. The disadvantages of plain rubber tubing are familiar and lie chiefly in the smell of the gas passing through the rubber, the short life of the tubing, and the liability for the gas supply to be interrupted when the rubber is kinked or trodden upon. Considerable attention has been paid to the development of a satisfactory alternative at a low price and some success has been achieved in so improving the quality of the rubber as to obtain extremely low permeability combined with long life.

A solid core of rubber is moulded on to the inside wall of the tube by a fine membrane. The presence of this internal core prevents the gasway being blocked even if the tubing is tightly knotted—thus the going out or lighting back of burners is avoided. The tubing is assembled on to metal ends which are screwed, thus avoiding any danger of the ends of the tubing being pulled off the connection. As a matter of interest, this operation is carried out by stripping back the membrane from the wall for a short distance and cutting out the core. The tubing is then inserted on to the special connector end which is stamped down, after which the spring is pressed into place.

The tubing is normally issued assembled, and three sizes are available, suitable for 5, 20, and 40 c.ft. per hour respectively—assuming not more than 5 ft. lengths to be used. In the interests of appearance the tubing is finished with light longitudinal corrugations and although at present only available in black may later be available in colours. Although the treatment is not recommended, the tubing is found to be capable of puncturing without subsequent leakage of gas, while an internal pressure of 100 lbs. per sq. in. fails to burst it. It is impossible so to damage the tubing that gas can leak without this damage being easily visible.

The manufacturers of "Corflex" gas tubing are Messrs. Abbott, Birks, & Co., of 113, Newington Causeway, S.E. 1, under licence of the patentees, the Gas Light and Coke Company.

"Radial" Gas Meters.

A great need of the Gas Industry is undoubtedly for meters having minimum external dimensions but capable of giving the maximum quantity of gas equably. A booklet on the subject of the new "Radial" meter has recently been published by Smith Meters, Ltd., of 186, Kennington Park Road, S.E. 11.

The distinguishing advantage of the latest development in this firm's meters—viz., slide valves with a "Radial" or pivotal movement and operation—it is stated, should be readily admitted when comparing this form of drive with the reciprocating type. It is, to use a homely simile, like the use of a capstan instead of directly hauling a load.

The first part of the improvement is to make the valves work with an oscillating radial motion, so that the action tends to shear any deposit from the valve faces and remove all longitudinal side thrust. The second part is that, with this design, larger valves are permitted to be used per external dimensions of case, thereby reducing the differential pressure, the meter consequently retaining a higher degree of registration accuracy. In the "Radial" movement there are no frictional points except the valve faces, the bushed pivotal movement being practically frictionless.

The booklet gives full specifications of the "Radial" meter, with a Table of comparison of standard sizes, with performance and prices. Further tables indicate the price of gas per 1000 c.ft. at varying quantities per 1d. and 1s. for prepayment meters, while illustrations show the simplicity of manipulation for change of coin denomination. With the "Ducoin" attachment there is only one operation to perform when changing from penny to shilling action or *vice versa*, and since the attachment housing has not to be removed, the services of a fitter are not necessary; the collector can easily make the change, which is a momentary operation.

PICTURES FROM NAPIER

Earthquake Damage at a Gas-Works

NAPIER, NEW ZEALAND. A view looking towards Hawke's Bay and giving some idea of the havoc wrought by the disastrous February earthquake. The fire-station in the foreground was completely demolished. Further seawards, the gas-works is indicated by an arrow, with the Glover-West retort house outstanding. As the smaller picture shows, the installation, which was built during the war but not put into operation until 1921 (it consists of 16 retorts) suffered severely, but withstood the shock remarkably well. [*From "West's Gas."*]

WATER TANK GASHOLDERS:

SIZES AND CAPACITIES

The author of this article discusses the Relationship of Capacity to Diameter and a Constant K

By J. C. K. Balfry, M.I.Mech.E.

Whenever the necessity of increasing the present gas storage capacity at an existing gas-works, or that of making provision for storage at an entirely new gas-works arises, certain questions always will emerge after the desired capacity has been determined.

Briefly put, these questions may be:

(1) Is the desired storage capacity realizable on the available site?

(2) What is the maximum storage capacity obtainable with a given tank diameter?

(3) What is the maximum tank diameter permissible for a given capacity?

(4) What is the minimum tank diameter allowable for a given capacity?

Question 1, obviously, is associated with sites old, new, or contemplated, but which are restricted as regards area or shape, and is necessarily involved with 2, 3, or 4.

Of questions 2, 3, and 4, if there is no restriction as regards height, then questions 2 and 4 may be paramount; but, if height is limited, then question 3 becomes the most important. Question 3 will also assume great importance if the nature of the ground is such as to demand the lightest loads per unit of area.

Objections to a tall structure may be lodged by private persons, institutions, or public bodies pressed to take action by force of public opinion. Hence it is very important to know, before proceeding too far in settling the size of the tank, and even of the holder, whether opposition of a serious nature is likely to be lodged against the erection of the proposed structure.

To any careful observer it would seem that some holders are "lanky" while others are "squat;" in other words, the ratio Diameter to Height varies considerably. To a reflective person it would appear that there may be some relationship between height, diameter, and capacity. A more careful observer will, however, have noticed that the ratio D/H (diameter/height) usually tends to become less to-day than formerly—in other words, that gasholders of earlier periods were "squat," while those of the present day tend to become "lanky."

This present-day tendency is due, principally, to three reasons: The desire, or necessity, for maximum capacity on a restricted ground area, the necessity of greater holder pressure than formerly, and usually the lower capital outlay involved.

That there is a rough ratio between Diameter and Height is shown by referring to Table 1, but this ratio is far too coarse as a comparison for general purposes between one gasholder and another.

Table 1.

Capacity. C.Ft. "C."	Approximate Height Fully Inflated Excluding Rise of Crown. "H."	Diameter of Tank. D_t	Ratio. D_t/H.
15 millions . .	222	300	1·35/1
10·4 ,, . .	165	285	1·73/1
6·5 ,, . .	174	226	1·30/1
3 ,, . .	126	182½	1·45/1
1 ,, . .	87	126	1·45/1
½ ,, . .	70	100	1·43/1
¼ ,, . .	51	80	1·57/1
100,000	44	58	1·32/1
50,000	36	45½	1·26/1

The mean value of D_t/H is 1·43/1; the maximum variation between 21 p.ct. above, and the minimum 12 p.ct. below the mean.

A careful investigation of the matter, however, in the course of which the capacities and dimensions of a very large number of holders situated in different parts of the world and designed and constructed by various persons and firms, reveals an interesting fact—that the ratio $\frac{D_t}{\sqrt[3]{C}}$ (D_t being the diameter of the tank, and C the cubic capacity of the holder) is a tolerably close ratio from the largest to the smallest holders, *provided that the latter have more than one lift*, a point that will be referred to later.

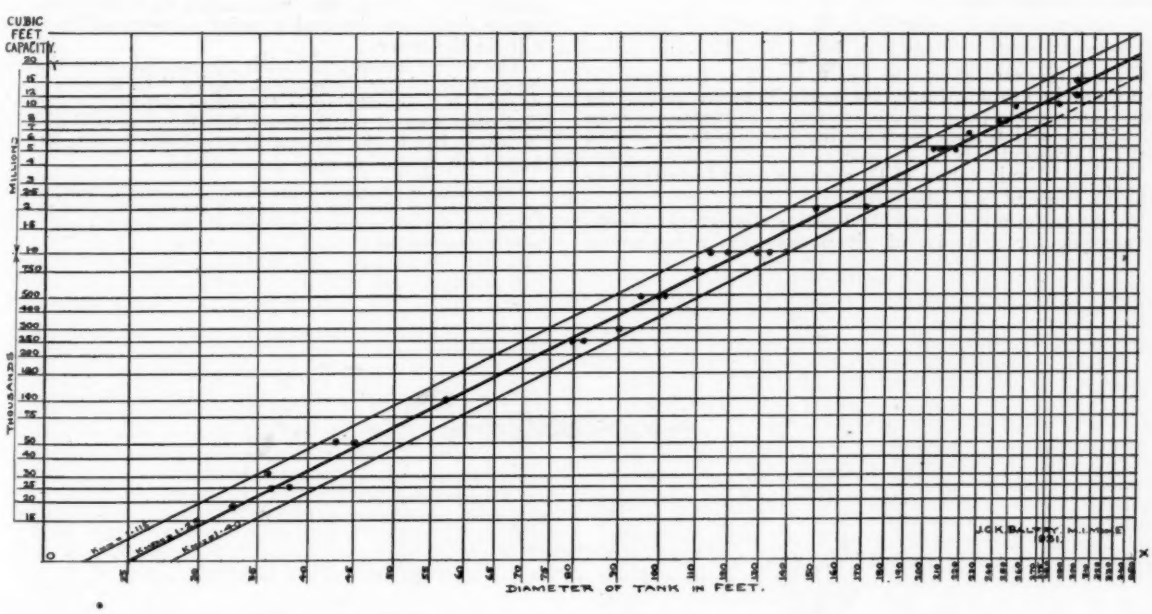


FIG. 1.

In Table 2 the same sizes of the holders given in Table 1 are repeated, but $\frac{D_t}{\sqrt[3]{C}}$ is substituted for D_t/H in the fourth column.

TABLE 2.

Capacity (C). C.Ft.	$\sqrt[3]{C}$.	Diameter of Tank. D_t.	$\frac{D_t}{\sqrt[3]{C}}$.
15 million	246·5	300	1·217
10·4 ,,	218	285	1·31
6·5 ,,	187	226	1·21
3·0 ,,	144	182½	1·27
1·0 ,,	100	126	1·26
0·5 ,,	79·5	100	1·26
0·25 ,,	63·0	80	1·27
100,000	46·5	58	1·25
50,000	36·9	45·5	1·23

The mean value of $\frac{D_t}{\sqrt[3]{C}}$ from Table 2 is 1·253, the maximum and minimum variations from the mean being 4½ p.ct. and 3½ p.ct. respectively, compared with 21 p.ct. and 12 p.ct. in Table 1. The mean value of the *large number* of instances referred to in the last paragraph is 1·25, maximum and minimum deviations from the mean being respectively 12 p.ct. above and 11 p.ct. below.

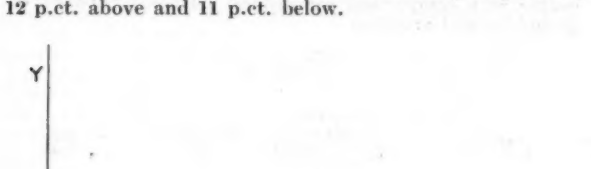


Fig. 2.

So that we may state that within reasonable and explainable limits the ratio $\frac{D_t}{\sqrt[3]{C}}$ can be represented by K—a constant. Hence $D_t = K \times \sqrt[3]{C}$ . . . . . (1)

A graph can therefore be drawn having ordinates parallel to OY representing capacities (C) and abscissæ parallel to OX representing corresponding tank diameters (D_t). If equation (1) be expressed logarithmically, the graph becomes a straight line

$$\text{Log } D_t = \log K + \tfrac{1}{3} \log C \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

$$\text{or Log } D_t - \log K = \tfrac{1}{3} \log C \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

On the diagram shown in fig. 1, which is equation (3) expressed in graphic form, the point K-mean marks the logarithmic value point of the constant 1·25 measured from O; K-max. and K-min. representing likewise those of 1·40 and 1·115 respectively.

The logarithmic values of D_t are measured from O along OX and those of $\sqrt[3]{C}$ along OY.

To obtain from the graph the limiting diameters of tanks permissible for a holder of given capacity, a horizontal line is drawn through the required point in OY parallel to the axis OX. At the points where this line cuts the inclined lines drawn from K max. and K min. perpendiculars are dropped to OX, the intersection therewith marking the limiting tank diameters in accordance with whatever value may be assigned to K max. and K min. Thus the limiting tank diameters for a 4 million c.ft. holder are found to be 222 ft. and 176 ft. The diameter according to the K mean line would be 197 ft.

Likewise, since every single ordinate drawn from OY marks a constant tank diameter, abscissæ to OY from the points of intersection of any ordinate with the three sloping lines will mark on OY the limiting capacities of holders, having regard, as before, to the maximum and minimum values assigned to K. So that for a tank diameter represented by OR (fig. 2) the limits of capacity would be Ol^1 for K min. and Oa^1 for K max. Likewise Ol^1, and Om^1 represent minimum and maximum capacities for a tank of OS diameter.

Similarly the maximum and minimum tank diameters for a holder of capacity Ol^1 are OS and OR respectively. Using the K mean line there is but one tank diameter corresponding to a particular capacity. In the case of Ol^1, it is OT.

Formula (1) does not contain any reference either to tank depth or to the related number of lifts required for a given capacity.

Theoretically a holder might have a tank of infinitely small depth and simultaneously an infinite number of telescopic lifts; hence the graph in fig. 1, and the equation from which it is derived, are not applicable to single-lift holders, in almost any tank of which additional lifts might be added, thereby very greatly increasing the capacity of the holder.

It is not proposed to deal with these matters, as they involve considerations of design beyond the scope of this article; suffice it to say that the question of the important ratio D_t/depth does not usually enter into the question with holders of less than 5 million c.ft. capacity. However, the maximum ratio 7 to 1, or whatever it may be, must not be lost sight of, and will occupy front-rank importance in preliminary calculations in holders of largest capacity.

The use of the K = 1·4 line demands caution in tanks of about 240 ft. diameter and upwards; otherwise it will entail tanks of what would be considered abnormal depth with correspondingly high water pressure and loads to be resisted by walls of whatever material they might be made. Furthermore, in tanks of (say) from 280 ft. up to 350 ft. diameter, since each foot depth of lift accounts for from 600,000 to 900,000 c.ft. capacity (in round figures), very careful computations must be made when determining tank diameters from holder capacities associated with those tank diameters, and *vice versa*. Particularly must the ratio D_t/depth* and tank depth be carefully watched. So that the K = 1·4 line is shown " dotted " after 240 ft. diameter of tank as a reminder.

Like all straight-line graphs, that shown in fig. 1 might be extended in either direction even beyond the limits of practical utility. Since the largest telescopic holder is at Astoria (U.S.A.) and has a capacity of 15 million c.ft., the graph has not been continued much past this point at the upper limit, nor beyond a point corresponding to 15,000 c.ft. in the lower.

The writer has not met with any special curve that might be considered the " compleat angler " to those who might consult it. Something is therefore left to the experience and discretion of the designer to whom, as well as to those in whose hands the lay-out of gas-works is entrusted, it is hoped the foregoing may prove useful.

* The writer is, of course, aware that the ratio 7 to 1, or whatever it may be, refers to the diameter and depth of the outer lift; but, after all, the figure 7 is but the nearest convenient whole number to one found from practice to be the limit.

THE "JOURNAL" TECHNICAL RECORD

Which contains Full Reports of Meetings of Gas and Allied Associations

B.C.G.A. Conference at Shrewsbury

It would have been difficult to find a more beautiful spot than Shrewsbury Castle on a brilliant May day for the Midland District Conference of the British Commercial Gas Association which was held there last Thursday. The President was to have been Mr. H. J. Hearn, J.P., Chairman of the Shrewsbury Gas Light Company, but unfortunately he was not well enough to attend. His place was therefore taken by Councillor R. D. Bromley, Deputy Chairman of the Company.

After the delegates had spent a short time in admiring the beauties of the Council Chamber in the Castle,

The MAYOR (Alderman W. Gowen Cross, J.P.) expressed regret at the absence of Mr. Hearn, and extended a hearty welcome to the visitors. He said that, reading a few days ago some statistics of the supply of gas during recent years, he was quite astonished to find that, in spite of unprecedented competition, the Gas Industry still continued to grow. Thus encouraged, they had every reason to be optimistic, and this frame of mind in itself was of extreme value in a time like the present. He congratulated the local gas undertaking on its success, for it compared well with others in different parts of the kingdom.

Mr. BROMLEY, replying, said he would like first of all to thank his Worship the Mayor for so kindly coming to welcome the members to this conference. As Councillor and Alderman, Mr. Gowen Cross had served the Borough for a great number of years, and this was not the first time he had occupied the post of Chief Magistrate. He added that Mr. Hearn had greatly looked forward to being with them that day. Gas undertakings, whether owned by corporations or companies, were in reality run in the interests of the community. The great question before the country to-day was that of economy. Whatever they might think about economy in its ordinary sense, they would agree that it was good economy to spend money on the use of gas. They were going to listen to Mr. Barker, of the London University, who would read a paper, after which he hoped there would be a useful discussion. At a Joint Gas Conference held in Birmingham during the British Industries Fair last year, Mr. Barker gave a most interesting paper describing his experience with various forms of heating in his own home. He always studied his subject from the economic as well as the scientific point of view. They were, therefore, fortunate in having this opportunity of hearing him.

GAS FOR WATER HEATING AND HOUSE HEATING.

By A. H. BARKER, M.Inst.C.E., B.A., B.Sc., Wh.Sc.

The first part of Mr. Barker's address was on much the same lines as that delivered by him at Galashiels a week previously, a summary of which appeared on pp. 357-359 of the "JOURNAL" dated May 6. In the course of the later portion of his lecture, Mr. Barker said:

The most serious of all the drawbacks of gas as a warming medium is its cost. For the sake of example, let us compare the cost of coke and gas for central heating purposes. With an ordinary coke boiler, in an ordinary installation, the usual order of efficiency is about 50 p.ct.—that is to say, about 50 p.ct. of the heat in the fuel will usually get into the building one way or another. With a good gas boiler, the percentage goes up to 80. In order to ascertain, therefore, the amount of heat that we actually get into our building for one penny, we have to multiply the gross cost of the heat by these percentages respectively. This gives us the following figures as available heat for one penny. With coke, 29,250 B.Th.U. for 1d. With gas, 8000 B.Th.U. for 1d.

The difference between these is, of course, very great, and this calculation is often used by inexperienced persons in misleading committees and clients on the subject of gas and electrical heating, of which they have themselves had no practical experience. It is the more misleading because for some purposes this advice is sound. If we compare, for instance, the actual cost of working an installation continuously with a gas boiler for a week, with that of working the same installation with a coke boiler for the following week, we find that the gas actually costs about 3·7 times as much as the coke.

It appears evident, therefore, that gas cannot be used in this particular way in economic competition with coke. If it is so used, it must be with considerable disregard to cost. No doubt there are some cases where its use in this way is justified by the additional convenience, the absence of dirt and labour, and other considerations of that character; but it is impossible to justify its use commercially in ordinary cases.

If we calculate as nearly as possible the equivalent money value of the nuisance of having coke delivered, and carrying it about, and the cost of stoking and of the removal of ashes, and general cleaning and so forth, I, at any rate, am unable to make a balance-sheet in which the use of gas is not, on the whole, much more expensive than coke; and, of course, if anyone were so mad as to use an electric boiler in the same way, it is obvious that an even worse result would be obtained.

How, then, can the use of gas or electricity for such purposes ever be justified? The answer is, by using the peculiar properties either of gas or of electricity in an appropriate way. Far more than half the heat delivered to an ordinary room by a coke or a gas boiler fixed in a cellar is wasted by being delivered either in an excessive quantity, so making the room too warm, or by allowing the heat to leak away en route, or by delivering it into the room at a time when the heat is not required—as, for instance, during the night, or in the early morning, before the occupants arrive. All this loss can be avoided by generating the heat at the point where it is required, and regulating it automatically to the exact value required.

Now the more intermittent the use of the room, the more it pays to use gas or electricity instead of coke, because, however intermittent the use of the room may be, the combustion of coke, or even of gas, in a central heating boiler cannot be regulated as required, on account of the heavy time lag always associated with any hot water heating device.

With gas appropriately used, and with electricity properly controlled, the heat is generated at the point where heat is required, thus avoiding transmission losses, &c., and is turned on automatically precisely in accordance with the requirements, thus avoiding excess of consumption, and is shut off promptly when the use of the room is no longer required, thus avoiding all time lag losses. There is very little time lag with either of these systems. A few minutes after the heat is turned on it is available, and it ought to be shut off before the heating effect is unnecessary. With gas a large power can be used to get the heat up rapidly, and it can be automatically shut off by thermostats, so as to prevent the heat from rising too high; and before the use of the room is discontinued the heat can be turned off to allow the maximum use of the heat already generated.

Now if either gas or electricity is used in that way in appropriate buildings, its cost is so greatly reduced by these economies as to compare not unfavourably with that of coke. At present prices, gas or electricity are usually more expensive in buildings for which they are not appropriate, except in cases like churches or a schoolroom or offices where the use is very intermittent. In such cases, it is often found actually cheaper to use an expensive but easily controlled heating medium like electricity, or gas, than a difficult fuel like coke. But it must be clearly pointed out that if this favourable economic result is to be obtained, the control must be very much closer than is

possible with such a system of coke or gas heated ordinary central heating, and a water circulating installation.

I have figures showing the total cost through a whole year of heating two identical school buildings side by side, one with closely controlled electricity and the other with coke, showing the total cost of heating by electricity was actually less than of heating by coke, and an even better result could be secured by using gas properly.

As far as my experience goes, gas never has been properly used in this sense, though electricity has. There are in existence systems of heating by electricity which, in appropriate buildings, can be adopted more cheaply than coke; and there ought to be, if there are not, similar installations heated by gas. I do urge the Gas Industry, if I may, to look into this matter without delay; otherwise it will soon be found that a large part of this load has been permanently taken from the Gas Industry by electricity, which, honesty compels one to say, is better and more convenient than is gas for this purpose, but it is also much more expensive, even with gas at any such price as 10d. a therm.

I would also advocate as strongly as I possibly can that the Industry should try with all its might to reduce the therm charge for gas for heating purposes to the public, for which its qualities make it eminently suitable; but it will not be by any of the standard methods such as gas radiators, or central gas boilers, or old-fashioned methods of that kind.

It can only be by the adoption of the much cheaper and much more economical radiant system, by which the amount of heat required in a room is only 60 p.ct. of what is required from a convection system, and by making an intensive drive to get gas generally adopted.

I think the gas radiator is capable of improvement, principally in four ways:

(1) To make it much more sightly than it is at present.

(2) To ensure that at all times, and in all circumstances, the gas used shall be completely burnt, so as to avoid even a trace of smell. Of the difficulty of this I am fully aware, but, before this kind of heating can be used with satisfaction to the general public, it must unquestionably be effected by some means.

(3) By putting the appliance under thermostatic control, so that it can never heat to an unnecessary degree the building in which it is fixed.

(4) By applying gas burnt in this manner to the principle of low-temperature radiation, by which the consumption of gas is reduced by 40 p.ct. for an equal effect.

I do not think, however, that to discharge the products of combustion into the air of a room in which people are living will ever be found satisfactory to the general public.

Gas Fires.

I do not think that the gas fire, in anything like its present form, will ever find universal use for house warming. First, because it is not sufficiently homely in appearance. In my view some form of gas fire must be designed which has a more or less close resemblance to a coal fire which can be turned low without spoiling its appearance. It must be capable of producing a brightly glowing effect when only burning a small quantity of gas, so as to be in the nature of a dummy fire which can be lighted for comfort's sake on a summer evening without throwing out a great deal of heat, but still retaining a good appearance. It must be capable of being ignited without the user striking a match and enduring an explosion. The best method is by a switch fixed at the door of the room. That this can be done I know, because I have seen it. Why it is not done universally, I do not know. The fire should be thermostatically controlled. One of the principal features of gas as a means of heating is its instant and easy controllability, but, as gas fires are fixed usually, they are controlled by a tap fixed on the floor by the side of the fire, often difficult to reach. In ordinary use this tap is usually turned "full on" or half on, and is never touched afterwards. This leads to a large waste of gas.

The fire should have its hand control easily accessible, and must be provided with a rough indicator whereby the consumer can see at a glance how much gas is being burned. Above all, the price of gas for such purposes must be reduced so far that the householder can feel that he is not on the way to the workhouse every time he lights his fire.

Gas for all house warming purposes could be made almost universal if some inexpensive method of low-temperature radiant heating by locally fixed gas flames, controlled as described above, could be adopted, provision being made for the complete withdrawal and suitable disposal of all the products of combustion.

The house warming field is almost unlimited, but householders need personal advice on such matters; they do not know what to believe of the Press advertisements they read. If I may give the views of an ordinary householder, who knows practically nothing of the economics of the Industry, I would say that every undertaking should deliberately cater for this class of business by reducing their tariffs and by having on their staff several well-informed, educated, and knowledgeable professional representatives who should be able to study the requirements of the individual householder, and advise him in detail how he can use gas for general household purposes to the greatest advantage, so that both the initial cost and the maintenance should be low. These representatives should be able to advise the ordinary householder much as a good consulting engineer advises the client who pays him. He should advise him impartially, that he is not led to use gas for purposes for which coke or electricity is the proper thing, and he should be able to apply a trained and experienced mind and imagination to the solution of the separate problems of each householder. He should spend all his time doing nothing else but getting this business for his company.

The installations that he advised should be such that each one will serve as an advertisement for convenience, neatness, and cost. Householders talk about these things to one another, and advertisements of that kind are much more effective than printed ones in the Press. If such a man would cost more than the value of the business he would bring in, then the Gas Industry must be very different from all the businesses I am familiar with.

My experience of the class of person who is generally available from the gas-works to advise the householder on such matters is not very favourable; certainly he is not such a person as would lead me, if I knew nothing about the subject, to follow any advice he might give, or even convince me that he knew much of what he was talking about, except perhaps how to put in a piece of pipe or stop a leak.

I also believe that a very much better system of frequent inspection of every burner in use would be of enormous advantage to the Industry. If any gas burner is in bad condition, the resulting trouble is charged against gas as a fuel, and not against the cook primarily responsible. I believe that if an expert gas man were to visit every customer's house (say) once a month, to have a rapid look round every burner in use, the cost would be repaid in increased business a hundredfold. My views are that if the Industry can reduce the price of gas for the purpose and convince the small householder of the facts relating to the use of gas for hot water supply and warming, and tell him definitely what it will cost him, the use of gas warming will be enormously increased. Every householder has the idea, which, one is bound to say, at present prices is well established, that the general use of gas heating is expensive, but it need not be if the gas burning appliances were under better and more convenient control.

If a gas undertaking were in a position to say to a possible customer, we will install a complete system of gas-heated hot water supply and warming in your house, so that you can have hot water or heat at any time, day or night, and we will charge you so much per annum per thousand cubic feet heated and so much per annum for every person occupying the house, and let you use as much gas as the automatic control will pass, on condition that you do not exceed a total consumption of so many cubic feet per annum, and if you use less than that we will give you a rebate, while if you use more we shall have to increase your rate in future, I believe that such an offer would result in an enormous increase in business.

The figures would have to be obtained experimentally by installing a dozen or so such plants in representative houses as a trial, and seeing what gas is actually consumed.

Again, I can see no reason why the Gas Industry should be debarred from charging different rates for different portions of the load, as is done by the electricity people—for instance, one tariff for lighting and cooking and a lower tariff for heating and hot water supply.

Alternatively, they might charge a certain percentage on the rateable value of the house, which would pay their own overhead charges, and a small sum per therm—say, 2d.—just enough to pay for the additional coal, with a reasonably small profit. Such a tariff would have a very strong appeal. Once a man paid his standing charge he could get his gas for next to nothing, which would nevertheless pay the company.

Discussion.

Mr. H. J. Woodfine (President of the Midland Association) said he thought that the lecturer had been unduly critical of gas fires, but he would leave other speakers to deal with this particular point. With regard to the statement that gas had not taken the place as a fuel that might have been expected of it in post-war developments, he would point out that no figures had been published to substantiate this contention. Very large numbers of gas cookers, fires, and wash boilers had been fixed

all over the country, and Wellington was no exception to this rule. It would surprise him to see figures produced showing that the electrical industry had put out more appliances than the Gas Industry. Storage heaters for gas were as yet comparatively new, and sustained propaganda of a local character was needed in the Provinces, where gas undertakings were differently situated from London and the surrounding districts. Coal in the Provinces was generally from 20s. to 25s. per ton cheaper than in London, and this made a great difference in getting business in water heating. Again, the habits of people differed, and daily baths were not so general as in the London area. The classes of property also had to be considered. In the country, where a first-class coal range existed, there was small chance of gas getting in unless something went wrong with the range.

Attractive Loads.

Frequently, however, gas could be got into places where they would least expect it. Storage space, getting into store and out again, and clear away ash, with its attendant labour, were among the considerations which made gas preferable to solid fuel, if the price was right. Business could be obtained giving large regular loads at attractive figures for gas. Such loads should be included in a tariff specially drafted. A series of rates per therm, according to quarterly consumption, with a bottom price of (say) 6d., gave gas a good chance of more business. If the circulation was reasonable in length and the job was really well lagged, satisfaction could be given, and quite a good efficiency realized. He had been successful in getting two or three fairly large installations for water heating into collegiate establishments in his district, at prices which had been found fairly attractive. One installation took nearly 1000 gallons over the day for washing-up and baths. There were a number of baths taken, and the cost, with gas at 6d. per therm, came out at 1·8d. each. The job was a thoroughly good one as regarded lagging, &c., and the efficiency worked out at 79 p.ct. This was a very nice load. With another installation in the same building the efficiency was not quite so high, owing to the fact that they had had to meet the requirements of the college in heating a very large drying closet for linen. Yet another large installation furnished 600 gallons of water a day, and in this instance there was an efficiency of 64 p.ct. In the first establishment the consumption had grown from 100,000 c.ft. per annum to 9,000,000 c.ft.; and in the second college referred to, from approximately the same quantity to 2,000,000 c.ft., for lighting, heating, and cooking. These cases were rather interesting. At any rate, they demonstrated the fact that with gas at a reasonable price there was business to be done. He agreed that the present system of a flat rate, with or without discounts, was not sufficiently attractive to obtain all the business they had waiting for them. On general lines, it seemed to him that the electricity tariffs were right. One tariff for lighting and cooking, and a lower tariff for heating and hot water, he did not think would be acceptable to the Gas Industry. A 15 p.ct. fixed charge on the rateable value of a house, and 6d. per therm, was, in his opinion, a tariff which would attract consumers and lead to a much greater consumption of gas for all purposes. The two-part tariff was, he thought, essential to the Gas Industry. If the Gas Industry could put a stop to the turnover from gas to electricity for lighting—which it could do, very largely at any rate, by means of an attractive two-part tariff—the time when electricity trading accounts would show a debit instead of a credit balance would be brought substantially nearer. With a fixed charge of 15 p.ct. on the rateable value of a house—which fixed charge would successfully meet the electricity fixed charges—and with gas at 6d. per therm, the weekly cost of running a 30-gallon storage heater to capacity would be 1s. 10d. for gas, 2s. 11d. for electricity at ½d. a unit, and 5s. 10d. for electricity at 1d. per unit. It was undoubtedly right that there was a great advantage to gas in the hot water load providing work for their plant in the summer, especially as so many of them were watching the gas engine load going over to oil; but unless they were quick and thorough in their methods of obtaining this load, and unless they had an attractive tariff to offer, electricity, which had even more to gain from this summer load than gas, would get the lion's share. Something had got to be done in the matter of tariffs, if they were to make further progress in the Gas Industry.

Weaknesses Should be Faced.

Mr. F. C. Briggs (Dudley) regarded Mr. Barker's paper as being particularly encouraging. He had pointed out ways in which the Gas Industry was useful to the community, and he had also drawn attention to some of its weaknesses. One of the great weaknesses of the Gas Industry was that it failed to look at its weaknesses. He did not think they always recognized how deeply rooted was the objection of the public to the appearance of gas fires. This had got to be met. The fixing was another important matter. If they cultivated the instinct of laziness of the public, it would pay them. Again, they did not make enough of the easy controllability of gas. As to tariffs, he did not agree with the rateable value as a basis for a fixed charge; he thought it was against their interests. He was all for the block system. The storage heater was a godsend, and they must make the best of it. It was going to prove very valuable, even at the present price of gas.

Mr. R. J. Rogers (Birmingham) remarked that it was to the good of the Industry that they should have criticism and suggestions such as they had received that morning. Most gas undertakings to-day had on their staff men who possessed technical knowledge of apparatus already in use; and many undertakings had men engaged in research work, looking after things which it was hoped would benefit the industry in the future. A surprising feature of a survey made in connection with the education of salesmen was that both the men and the women in the showrooms were found to be particularly well versed in the appliances with which they had to deal. This was reported by an observer whose special duty it had been to ascertain what was the position in the Industry in this respect. Therefore they had well-informed advisers for their consumers.

An Example of Controllability.

He agreed with Mr. Briggs that the controllability of gas was a subject which they were not pressing home sufficiently to prospective users of heat for all purposes. There were in Birmingham somewhere about sixty municipal banks, and they were provided with gas heated boilers. The gas was turned on at a predetermined time in the morning, and the provision of thermostats gave them all-round controllability of gas. He was certain that there was a very big field for this sort of thing, but, of course, there was the question of cost to be considered—not only of gas, but often a fair amount of capital was necessary. The Gas Industry on some occasions was rather slow to act, and it was advisable that from time to time they should have their memories jogged.

Physiological as well as Psychological?

Dr. C. M. Walter (Birmingham), referring to the radiation from the open coal fire, said that the question of its physiological effect upon the human being seemed to be deserving of very careful consideration. It would appear that the pleasing effect experienced from the radiation from coal fires was possibly due either to the luminous and heat radiations of varied wave lengths or to the presence of radiations of particular wave lengths which had a physiological effect upon the individual. It was well known that radiations of certain wave lengths were more easily reflected than others; and this might have some bearing on the matter, which appeared to be concerned not altogether with psychological, but to some extent with physiological effects.

Alderman J. H. Lloyd (Chairman of the Birmingham Corporation Gas Committee) proposed a very hearty vote of thanks to Mr. Barker, who had given them so many points to discuss. It was exceedingly satisfactory to realize that they were on the road to further progress. It should be kept in mind by all that an unsatisfactory installation damaged the cause of the Gas Industry. On the subject of tariffs, it seemed to him unfair that a man who used a large amount of gas for lighting should pay at a higher rate than a person who consumed a smaller quantity for some other purpose.

Mr. W. M. Mason (Manager of the B.C.G.A.) seconded the vote; remarking that they had had in the address a very good mental stimulant. Any criticism Mr. Barker made deserved their earnest consideration.

The vote was passed enthusiastically, and acknowledged by Mr. Barker.

Luncheon.

The morning session concluded, members and friends adjourned to Morris's Café—an admirably appointed restaurant in the heart of the town—where they sat down to a well-served luncheon, by invitation of the Directors of Shropshire Gas Undertakings. Councillor Bromley was in the chair.

Alderman Harold Mason, M.B., J.P. (Chairman of the Leamington Priors Gas Company), proposing "The Mayor and Corporation of Shrewsbury," said that, as was the case with the Leamington Gas Company, the Shrewsbury Gas Company were on very good terms with the Corporation, and this was a great advantage all round. The Mayor, responding, said that he was very pleased that Shrewsbury should have been chosen for this meeting. To-day the cry was for economy; but when people were told that economy meant spending money in the right way, they would not believe it. The toast of "The Gas Industry" was submitted by Mr. A. E. White, B.A., B.Sc. (Principal of the Shrewsbury Technical College), who referred to the excellent position of the Gas Industry, and the advantage it enjoyed from sharing its knowledge. Everyone in the gas industry appeared to be influenced by loyalty, and by the belief that he was doing something for the benefit of the community. Replying, Mr. H. J. Woodfine expressed his great faith in the future of the industry.

Mr. W. M. Mason proposed a hearty vote of thanks to Councillor Bromley, who had so kindly stepped into the breach caused by the regretted indisposition of Mr. Hearn, and this was carried with applause.

The Afternoon Session.

The afternoon was devoted to a public conference in the Castle on the subject of Atmospheric Pollution.

Dr. R. Veitch Clark, M.A. (Medical Officer of Health to the City of Manchester), who is a well-known authority on the matter, gave an address on "Atmospheric Pollution in Relation to Health;" and he was followed by Mr. C. M. D. Belton, who read a paper on the "Contribution of the Gas

Industry towards Reducing Atmospheric Pollution." There was a short discussion, after which tea was served.

HOW THE GAS INDUSTRY REDUCES ATMOSPHERIC POLLUTION.

By C. M. D. Belton, Assoc.M.Inst.C.E., A.M.I.Mech.E., F.C,I.S. (Engineer and Manager, Shrewsbury Gas Light Company.)

The question of smoke abatement has outgrown the stage of being a new and controversial matter, and public opinion may be said to favour the reduction of atmospheric pollution due to dense clouds of black smoke issuing from factory chimneys.

The prosperity that was supposed to be indicated by large numbers of smoking chimney stacks would be more than welcome in these days of trade depression; but the increased use of smokeless fuels which has developed during the last few years makes it possible for hundreds of different industries to avoid spreading trailing clouds of black "glory" across the sky, though the factories may none the less be working at full stretch. Moreover, there is another kind of depression, besides that referring to trade—namely, the mental state to which smoke clouds contribute by obscuring the cheerful rays of sunlight which we value so much. (Of course, there is *one* kind of smoke which is efficacious in *relieving* mental depression!)

It does seem extraordinary in these enlightened days when so many precautions are taken to ensure the purity of our food and water that no steps are taken in a corresponding manner to prevent the pollution of the air we breathe, and the obstruction of the health-giving rays of the sun. The production of smoke is nothing less than a national crime, and the chief offender is, undoubtedly, the domestic chimney. No less than 40 million tons of coal are annually consumed for domestic purposes alone, resulting in a waste in the form of smoke and soot amounting to 2½ million tons.

The Domestic Chimney.

It is interesting to note that only a few days ago the question of Smoke Abatement was raised in the House of Lords, when a question was asked as to what measures are being taken by the Government to deal with smoke abatement. The reply was that "a great deal was being done to solve the problem; but that the domestic coal fire was the real obstacle to true reform." The Ministry of Health was criticized for apathy in not seeing that public money was properly spent as regards preventing pollution from the domestic open fire in Housing Schemes. A further suggestion was that there might be a remission of income-tax under Schedule A in respect of houses which do not produce smoke. This latter is an interesting suggestion, which is worthy of further exploration.

The Gas Industry does not pretend that the main object of its existence is to clear the atmosphere; but it does contend that by the economical distillation of 18 million tons of coal annually it provides two smokeless fuels, in the form of gas and coke, the extended use of which is undoubtedly helping to reduce the smoke nuisance.

There is no useful work done by coal that cannot be done equally well with gas or coke, and without the waste inseparable from the use of coal. The advantages of gaseous fuel are so numerous and widely known that it is hardly necessary for me to enumerate them, but there are one or two points which I would emphasize. Controllability is one outstanding and unique feature of gas which is extremely useful in all types of work where heat is required, and the development of the thermostat for use with cookers, water heaters, and industrial appliances enables the actual temperature to be regulated automatically within very fine limits of accuracy.

Another distinct gain to the user of gaseous fuel is the cleanliness of the operation. There are no coals to carry to the job or ashes to take away, and consequently the appliances themselves, as well as the rooms in which they are placed, are very much cleaner, and therefore healthier. In addition, the general handiness of gas brought by piping right up to the point of use saves labour of a sort that is never pleasant, and gas does not claim valuable space for storage, except at the gas-works.

Ventilation.

Although it is possible to have room-heating appliances of a portable nature which do not require a flue, it is very inadvisable to use these in any but very small units. The advantage of having a gas fire communicating with the chimney flue is that ventilation of the room is secured by the injector action of the ascending products of combustion. These do not, as in the case of coal fires, choke the flues and poison the upper atmosphere, but pass away quite invisibly and harmlessly.

The products of the incomplete combustion of coal as practised in the domestic grate are essentially both wasteful and harmful. They contain valuable oils and solid combustible matter, and they also contain sulphur in a form that causes the subsequent deposit of acid by moisture on buildings, the deleterious effects of which are only too obvious on many of our most beautiful and treasured specimens of national architecture.

The only drawback to the gas fire from a woman's point of view is that it does not need the poker, and the man's objection is that he cannot knock his pipe out into it or burn his waste paper. How these psychological defects can be remedied is a question I am not able to answer completely.

In Shropshire generally you would not say that there is any substantial nuisance from smoke, and therefore why make a song about it in Shrewsbury. But this is a Midland District Conference, and the areas embraced in that District include many industrial centres, as well as those of a purely residential character. Nevertheless, even over Shrewsbury, on a heavy winter's day, you may observe a blue-black pall due to the emission of smoke from domestic chimneys mingled with that from the comparatively few of the industrial kind.

Washing Dirty Linen.

Monday is supposed to be the popular day for the weekly home laundry. One might say it used to be consecrated to the desecration of the atmosphere by the smoke from innumerable wash-house chimneys. This, however, is no longer true of Shrewsbury—and other enlightened towns—for thousands of gas-heated wash-boilers are now in use, thus eliminating the dirty drudgery of stoking the boiler fire, and the annoyance of smuts alighting on clean linen.

The possibility of having a hot bath at night used to be an open question owing to the vagaries of the kitchen range, and a hot bath in the morning was an unheard of thing in the majority of households. The advent of the various types of gas water heaters, however, has revolutionized that state of affairs, and emancipated the household. Single point and multi-point geysers have led the way, and now the latest type of storage water-heater is a successful development providing an economical and efficient supply of domestic hot water at any time.

Moreover, in the actual process of gas manufacture the production of smoke is almost entirely obviated owing to the fact that we distil coal in sealed retorts, instead of burning it; also we use our own smokeless gas coke for the producers heating the retort settings, and for steam boiler firing. This is in marked contrast to the method of steam raising where electricity generators are so driven and boilers are fired with slack.

It is therefore reasonable to claim that the Gas Industry in its own works operations, and in the services it provides for the community, is a substantial contributor to the reduction of atmospheric pollution.

Wales and Monmouthshire Junior Gas Association.

The Ninth Annual General Meeting of this Association was held at the Gas Offices, Bute Terrace, Cardiff, on Saturday, May 2—Mr. C. H. Collins (President) ocupying the chair.

The Hon. Secretary (Mr. H. S. Bartlett) submitted the Ninth Annual Report, on behalf of the Council, covering the session just concluded. The report was approved and adopted, on the proposition of Mr. A. E. Mogford, seconded by Mr. A. W. Stickler (Cardiff).

The Hon. Treasurer (Mr. B. J. Bell) presented the statement of accounts, which showed a balance in hand of 13s. 4d. The accounts were also adopted on the proposition of Mr. T. Noall (Cardiff), seconded by Mr. W. H. Evans (Newport).

The appointment of Officers for the ensuing session then took place, and resulted in the following being elected:

President.—Mr. S. E. Brett (Rhondda).
Senior Vice-President.—Mr. C. S. Thane (Newport).
Junior Vice-President.—Mr. H. S. Bartlett (Cardiff).
Hon. Treasurer.—Mr. B. J. Bell (Cardiff).

Mr. H. S. Bartlett agreed to carry out the duties of Hon. Secretary for another year, having as his Assistant Hon. Secretary Mr. W. T. Lane.

Out of four nominations received for two vacancies on the Council, the two elected were Mr. E. E. Moore (Swansea) and Mr. R. T. Mills (Cardiff).

Messrs. A. W. Stickler and T. Smith (Cardiff) were duly elected Hon. Auditors.

The meeting terminated by an outline of the recently launched Education Scheme for Salesmen. This was given by Mr. B. J. Bell.

London and Southern District Junior Gas Association

The Annual General Business Meeting of the London and Southern District Junior Gas Association was held at the Westminster Technical Institute on Friday, May 1—Mr. T. H. PRATER, of Margate, the President, in the Chair.

The ASSISTANT HON. SECRETARY (Mr. G. Gardiner, of Wandsworth) read the minutes of the last meeting, which were duly confirmed.

The HON. TREASURER (Mr. H. G. Soar) then presented the financial statement for the past session, which showed a balance in hand of £155 12s. 4d. Mr. Soar remarked that this was the sixth time he had had the privilege of presenting the balance-sheet. He would like to pay tribute to the work of their new Auditor, Mr. S. C. Waldock, for the way in which he had been through the books.

Mr. F. S. LARKIN proposed the adoption of the balance-sheet, and the proposition was seconded by Mr. H. C. SIMS, and carried.

The PRESIDENT thanked Mr. Soar for his work this year and in all past years.

REVIEW OF THE SESSION'S WORK.

The PRESIDENT, in the course of a review of the working of the Association during the past session, said: The vigour of any association is directly indicated by the importance attached to membership and by the eagerness of applicants to obtain entry. This session has given abundant evidence of the importance and vigour of our Association, and has also created a record for the number of new members. It is also interesting to remember that since 1926 we have required a definite educational standard before considering applicants. The membership now stands at 401—an increase of 43 during the year.

The education of juniors in the Gas Industry has now reached a point when the Scheme can be considered to be in almost thorough-going order and when little or no complaint can be made of isolated students. During the last year it has been very clear to me as Secretary of the District Education Committee for this area that inquiries from students are now more matters of interpretation of the regulations than special cases, which indicates that the introductory period of the Scheme is at an end.

The session just closing has provided papers and visits covering a wide range of subjects. Of the visits at least two have appeared for the first time on our syllabus—*i.e.*, to a refractory works and to a modern colliery—while papers on subjects not previously presented have treated "electrical plant on gas-works," "refrigeration," and "incomplete combustion." It has been suggested that our programme provides insufficiently for the supply and distribution side of our membership; but it must be remembered that the Salesmen's Circle is an extra organization providing entirely for that section. An analysis of our syllabus will show that three of the six papers were definitely concerned with supply, while of the six visits at least one was essentially of use to the supply men; although visits can nearly always be considered to be of general interest.

Since our last annual general meeting the Institution bronze medal awarded for the best paper given by a junior before a Junior Association has for this second time come to our District, and was secured by Mr. A. G. Grant with his paper dealing with "Gas Oil Carburettors." This year your Council have decided to submit from this Association Mr. Percival's paper on the "Control of Horizontal Retort Settings."

Among the many matters discussed by your Council, I feel disposed to mention one or two in order to inform you of decisions that otherwise would not be known to you. We have dismissed the possibility of giving membership to those connected with the production of gas-making plant and gas-using appliances.

Finally, I would like to commend to all our members who come into definite contact with the consumer, the new course of study organized by the B.C.G.A. While perhaps the education of the gas salesman is not immediately our domain, yet the fact that a number of our members are, or will become, salesmen, and that we as a junior organization are directly interested in any education connected with our Industry, makes me feel it is not out of place to recognize the debt we owe to the B.C.G.A. for their work in this important branch. This Scheme is one that has benefited through the defects and shortcomings exposed in the workings of the Gas Education Scheme, and for your information I have arranged for some booklets explaining the Scheme to be available.

In conclusion, I would thank you for your interest and support during this winter.

The report upon the work of the Association for the session 1930-31 was adopted upon the proposition of Mr. J. M. WEBBER (Croydon), seconded by Mr. BUTTERFIELD, and in acknowledgment, the PRESIDENT said that it had been a privilege to preside at their meetings. He remarked that in the work of the Association during the past session he had travelled 3200 miles, which showed that it was possible for a president to live at some distance and for the work to be carried on successfully.

A vote of thanks to the officers and Council of the Association was then carried on the proposition of Mr. H. J. RISBY (South Metropolitan), seconded by Mr. J. H. COOKE (Gas Light), who remarked that the officers had worked very hard for the Association during the past session, and their thanks were due to the President for coming such a long way in order to be present at all their meetings, which showed the great interest he took in the Association.

Mr. SIMS replied on behalf of the officers and Council.

PRESENTATION TO PRESIDENT.

Mr. SOAR next proposed that a testimonial, taking the form of a salver, suitably engraved, be presented to their President when he vacated the Chair. This was seconded by Mr. RISBY, and carried.

The PRESIDENT acknowledged their kindness, remarking that this was the tangible token of appreciation, but the real satisfaction to him was the fact that the session during which he had been their President had been so successful. He would like to mention their Hon. Secretary, Mr. Higton, for his work on the Council. It had usually been a matter of elevating their Assistant Secretary to the post of Secretary, but in this case Mr. Higton had come straight to the post as Secretary, and he had carried out his work very successfully. He had been surprised at the amount of work to do, but he had not shirked it, and the result was something of which he could be proud.

ELECTION OF OFFICERS AND COUNCIL FOR 1931-32.

The following officers and Council were then elected for the session 1931-32:

President.—Mr. J. Howard Goldsmith (South Suburban).
Senior Vice-President.—Mr. Arthur Tennant (East Surrey).
Junior Vice-President.—Mr. H. C. Sims (South Metropolitan).
Hon. Treasurer.—Mr. H. F. G. Soar (Gas Light and Coke Company).
Hon. Secretary.—Mr. F. H. G. Higton (East Surrey).
Assistant Hon. Secretary.—Mr. George Gardiner (Wandsworth).
Hon. Auditor.—Mr. S. C. Waldock (Gas Light and Coke Company).
Council.—Messrs. G. Gardiner, J. M. Webber, F. C. Smith, P. F. Scarth, R. Summerson, H. J. Risby, S. H. Miles, R. N. LeFevre.
Representatives on District Education Committee.—Messrs. T. H. Prater, J. H. Goldsmith, F. H. Higton, and A. Tennant.

Mr. GOLDSMITH referred to the work of their President in his capacity of Secretary of the District Education Committee.

Mr. HAWES (Tottenham) supported Mr. Goldsmith's remarks.

The PRESIDENT briefly responded, remarking that it was a work with which he had always been closely associated.

It was decided to send a letter to Mr. Stuart Ker, Principal of the Westminster Technical Institute, thanking him for his help and for the facilities afforded the Association.

A vote of thanks to the Technical Press was carried on the proposition of the PRESIDENT, seconded by Mr. SIMS, which was duly acknowledged.

Colombo Gas and Water Company, Ltd.

The Annual General Meeting of the Company was held at the Company's Offices, 148, Gresham House, Old Broad Street, E.C., on Monday, May 4, 1931—Mr. ROBERT H. GLEN, F.C.A., Chairman, presiding.

The SECRETARY (Mr. A. C. Pullen) read the notice convening the meeting and the Auditor's report.

The CHAIRMAN: Gentlemen, a copy of the report and statement of accounts having been sent to all the members, I will ask you to take them as read.

My first duty is to refer to the great loss the Company sustained in October last by the death of Mr. Strachan C. Clarke, who became Chairman in 1924. Mr. Clarke had been ill for some time, but was able to come to our annual meeting last year and we all had hoped he would completely recover his former health, but unfortunately later on his condition became more serious. Mr. Wardrop for some time undertook the post of Acting Chairman. You will remember that at our gathering in 1929, the shareholders had the pleasure of presenting Mr. Wardrop with a salver to commemorate his fifty years' connection with the Company. Mr. Wardrop's invaluable services were at the Company's disposal in Colombo during its dark days in past years and we sincerely hope he will long enjoy his good health and be enabled to carry on his work for the Company's welfare. The Board have appointed me as Chairman in Mr. Clarke's place and two new Directors have been elected—viz., Brigadier-General Goland Clarke and Major Heriot Glen. These gentlemen submit themselves to-day for re-election.

The welfare of a public utility company such as ours is intimately bound up with the state of trade and industry in the area of our operations. As you probably are aware, the staple industries of Ceylon are all in a very depressed state and that has had an adverse effect on all business in Colombo. In addition, the world-wide economic depression has affected Colombo adversely in restricting the large volume of tourist traffic, which formerly brought prosperity to the hotel and other allied industries of the Colony.

For the first time during many years, the Company report a falling off in its gas sales. The quantity used for cooking and heating was about the same as before and public lighting went well ahead, but private lighting has fallen off considerably.

Speaking as I do after the conclusion of four months of 1931, I cannot hold out hope that during this year we shall regain the loss in output, unless, of course, a very decided revival in trade soon takes place. The Board study all the points relating to our business very closely and I would here just repeat the wonderful increase in our load for heating and cooking, thanks, no doubt, to the low rate of Rs.3 (4s. 6d.), which for some years has been charged for same. The sales under this head for 1920 were 34 millions, for 1924 59½ millions and for 1930 159 millions.

To deal now with the accounts, the only addition to capital was £3173 for new mains. There appear to be no expenses of a heavy nature connected with the works necessary in the near future.

The cost of coal was lower by Rs.3987; we used 600 tons more, but the rate per ton was reduced by 89 cents. The fact that we put out less gas and used more coal is explained by a lower make per ton. We expect to show a still lower rate of cost per ton of coal in 1931.

Working expenses were Rs.38,813 less. There was no re-setting of retorts and the expenditure on advertising, which you see under this head, was reduced by Rs.21,470.

Wages for fitting work was Rs.26,650, compared with Rs.32,196 in 1929.

Depreciation, &c., of stock increased by Rs.6738. Additions to meters and appliances on hire account for this.

Fixing Cookers account is down by Rs.10,690; only 138 new cookers were fixed in 1930, as compared with 322 in 1929. Fixing Geysers account is new, because of the large number of geysers now being put out on hire.

Bonus to local staff and workmen, although a high figure, was less on account of the fall in profits and the readjustment of basis for local clerks and workmen.

On the credit side of the revenue, gas rentals amounted to Rs.838,306, as compared with Rs.927,967 This falling off of Rs.89,661 is due to the lesser quantity for private lighting.

The consumption for street lighting continues to increase satisfactorily and we do all in our power to foster this important branch of our business both by giving it our special attention and by charging the Council a low rate. We are glad to know that the service we render is appreciated by the authorities and the public. The question of private lighting engages the anxious consideration of the Board.

Receipts from residual products are down; more coke was sold, but the average price realized was lower; in fact, it was only about one-half the net price of six years ago and has declined in greater ratio than has the cost of coal. You will see by the accounts that the net revenue from residuals shows about 77 p.ct. on cost of coal. Of course, we have shown better figures than this, still, it speaks well for the Colombo working and for our buying of the coal.

The accounts grouped under gas fittings show in the total a diminution, the turnover on fittings work being considerably less.

The final profit for the year is not so high, but we are trying by every means to consolidate the Company's future.

The balance-sheet shows that our cash investments, stores, and debtors are £71,485 in excess of the cash liabilities.

The capital expenditure on land and works (not reckoning with depreciation account shown in the balance-sheet) stands now at £557 per million c.ft. made. This is higher than at the end of 1929, but, of course, the works are capable of greater business than is being carried out at the present time.

I think these are all the comments I need make on the accounts, but shall be pleased to answer any questions thereon which you may care to put to me.

The balance of net revenue is £25,301 and the Directors recommend a final dividend of 3½ p.ct. on the preference shares, *less* tax and a final dividend on the ordinary shares of 5 p.ct., free of tax, also that £5000 be added to general reserve, which will then stand at £70,857.

A satisfactory feature of the year's working, which I would emphasize, is that gas unaccounted for was reduced from 14·84 p.ct. in 1929 to 10·45 p.ct. in 1930.

The general depression in trade has reflected very considerably upon our output, but we hope in the near future business in the Colony may revive. Competition from electricity is becoming more and more keen, although the hydro-electric scheme for Ceylon does not appear to progress.

During 1930 I visited Colombo to inspect our gas-works and study the local conditions on the spot. Our works and plant are models of efficiency and compactness and reflect great credit on our staff, particularly our Engineer and General Manager, Mr. Barker Johnson, whom I am glad to see present with us to-day. I was favourably impressed with the way in which our business is being looked after and feel that the prospects generally are quite satisfactory.

With these remarks, I have pleasure in moving that the report and accounts be received and adopted.

Mr. JOHN G. WARDROP seconded the motion, which was carried unanimously.

The CHAIRMAN then moved the following resolution:

> "That a dividend for the year ended Dec. 31, 1930, at the rate of 7 p.ct. per annum upon the preference shares, *less* income-tax and 10 p.ct. per annum upon the ordinary shares, free of income-tax (both *less* interim dividend paid Oct. 11, 1930), be and is hereby declared, the warrants to be payable on May 8, 1931,"

which was seconded by Major HERIOT R. GLEN and unanimously carried.

The CHAIRMAN: I have now to propose the re-election of Brigadier-General Goland V. Clarke and Major Heriot R. Glen as Directors of the Company. General Clarke is a Director of other gas companies and his position of Brigadier-General is due to the energy and abilities he displayed in the Army during the war. Major Glen is Director of another Eastern gas company and is well acquainted with Colombo.

Mr. A. W. OKE said, as a shareholder, he would like to second the motion. He referred to the deep loss the Company had sustained by the death of the late Chairman, who was a very able man. He was glad to see that Brigadier Clarke came from the same family, who were well acquainted with gas.

Brigadier-General CLARKE thanked the meeting and said that it was to him a sad feeling that he should be appointed through the death of his brother, who was for so many years a Director, but he would endeavour to follow in his footsteps.

Major HERIOT R. GLEN also expressed his thanks for re-election.

Mr. DOUGLAS W. CLARKE proposed that Mr. Wm. Cash, jun., M.A., F.C.A., be re-elected as Auditor for the current year at a fee of ninety guineas, which was seconded by Mr. SYDNEY J. TUNGAY and carried unanimously.

The CHAIRMAN proposed a very hearty vote of thanks to the officials of the Company at Colombo and here. He again referred to his recent visit to the Colony and to the satisfactory work being performed there by the officials. He mentioned the hard work of the Secretary and that the duties of the Board would be much more difficult but for the help afforded to them by Mr. Pullen.

Mr. SYDNEY J. TUNGAY seconded the motion and said that, in view of the world-wide depression in trade, the Company's results reflected very creditably on the work of the Engineer and Manager, Mr. Barker Johnson. Mr. Tungay also mentioned the very large part played by the Secretary for so long in furthering the interests of the Company.

In acknowledging the vote of thanks on behalf of the Colombo staff, Mr. BARKER JOHNSON said it gave him real pleasure to be present at this meeting and to offer in person his thanks for the kind expressions made regarding himself and the Company's personnel in Colombo generally. It was true the Island had been touched with the clouds of world-wide depression, but no doubt the trade pendulum would swing in the other direction within a year or so, when a return to the former phenomenal increases in gas sales would, it was hoped, be again recorded.

Mr. A. E. HAYES proposed a vote of thanks to the Chairman and Directors, which was seconded by Mr. A. W. OKE and unanimously carried. The proceedings then terminated.

PARLIAMENTARY INTELLIGENCE

[From Our Special Correspondents]

House of Lords.

Private Bills.

The Guildford Gas and Cranleigh Electricity Bill has been reported from the Committee without amendment, read a third time, and passed.

The Mid-Southern District Utility Bill has been reported from the Committee without amendment, and is awaiting third reading.

The Gas Light and Coke Company Bill has been read a third time, and passed. The Royston and Brodsworth Gas Bill has been reported, with amendments, from the Unopposed Bills Committee.

Special Orders.

The East Hull Gas Order and the Croydon Gas Order, as reported from the Special Orders Committee, have been approved by the House.

House of Commons.

Private Bills.

The Gas Light and Coke Company Bill has been read a first time and referred to the Examiners.

The Lowestoft Water and Gas Bill has been read a third time and passed.

The Edinburgh Corporation Transport Gas and Finance Bill is being heard by the Examiners to-morrow.

The petition of the Yorkshire Electric Power Company and Electrical Distribution of Yorkshire against the Sheffield Gas Bill has been withdrawn.

The petition of the Hartlepool Gas and Water Company against the West Hartlepool Corporation Bill has been withdrawn.

Special Orders.

The East Hull Gas Order and the Croydon Gas Order have been approved.

Low-Temperature Carbonization.

In reply to questions by Commander Bellairs and Mr. Gordon Macdonald, the Secretary for Mines (Mr. Shinwell) made an important statement of the Government's policy in regard to the future of low-temperature carbonization research work. Mr. Charles Edwards (Lord of the Treasury) read the statement: I am authorized on behalf of the Government to make a statement of the policy which the Government propose to follow in relation to those aspects of the problem of the scientific treatment of coal on which decisions have been reached.

I will deal first of all with the Richmond experiment. The decision to close down this experiment was taken after full discussion between the Mines Department and the Department of Scientific and Industrial Research acting for the Government, and the Gas Light and Coke Company. This experiment was inaugurated by the late Government in the belief that it would provide definite information as to the commercial possibilities of the process. In a statement made to the House on behalf of that Government on May 11, 1927, it was stated that it was hoped that the plant would be at work in the following winter. The agreement with the Gas Company provided that a site would be made available till the end of 1930, at which date the Company should have the option of purchasing the plant, or, if they did not wish to do this, they could require the subsidiary Company formed to operate the plant to clear the site. The plant did not come into operation till February, 1929, so that less than two years remained of the period covered by the agreement. For part of that period the plant was entirely closed for various reasons, and at no time worked at full capacity. Towards the end of 1930 the Company gave notice that they did not propose to exercise their option to purchase the plant. Accounts which had been made available to the Mines Department under the agreement indicated that the financial results of the experiment were disappointing.

In view of the large expenditure of public money on the scheme, I entered into discussions with the Gas Light and Coke Company with the object of exploring the possibility of continuing the experiment for a period of three or four years with the Mines Department and the Department of Scientific and Industrial Research supervising the operations. The Gas Light and Coke Company expressed their inability to agree to this proposal. They were willing to continue the experiment themselves for another year or so on the limited scale on which operations were then being carried out (only eight out of 40 retorts were working); but they intimated that in view of contemplated changes at their works they were not able to afford facilities for the longer period.

The Government reached the conclusion that a continuation on the basis suggested would serve no useful purpose, and the experiment was closed down at the end of February last. Since then I have given careful consideration, in consultation with the Department of Scientific and Industrial Research, with which my Department is working in the closest touch, to the question of how best the Government could assist the development of low-temperature carbonization and other processes for the scientific treatment of coal. The Government believe that the development of these processes should be encouraged, as their successful operation would be of benefit to the coal mining industry and to the country generally.

Since 1927 substantial progress has been made with low-temperature carbonization, and certain processes are being operated on a commercial scale. As is the case with any new industry, difficulties are still being met with; but it is the hope of the Government that they will be overcome. The Government desire to render assistance in the development of low-temperature carbonization, and after a careful review of the position they have come to the conclusion that there are two main directions in which effective help can be given. The first is in attempting to improve the value of the tar oils, which are a substantial bye-product of low-temperature carbonization. At the present time the prices which can be obtained for these crude tar oils are at a very low level, and the main hope for a better return lies in improving the methods of treating these tar oils. Experimental work has for some time been carried on, on a comparatively small scale, at the Fuel Research Station. As a result of these experiments it is considered that the most promising field for the utilization of the tar oil is the production of motor spirit and Diesel oils. It is therefore proposed to proceed at once to develop the laboratory scale experiments to a small commercial scale to cover the hydrogenation, cracking, and refining of tar oils. The erection of the necessary plant is estimated to cost about £33,500, and the annual cost of the additional staff and maintenance is estimated at £8000. The Department of Scientific and Industrial Research is also prepared to make a grant subject to the usual conditions now applicable to co-operative industrial research associations, if schemes of research on tar oils are submitted to them by any recognized association connected with the industry. Such research work would be carried out wherever the association has the necessary facilities.

The second direction in which the Government are prepared to assist is in inducing a wider use of the smokeless low-temperature fuel. Instructions are being issued to Government Departments which purchase fuel that they should use a proportion of low-temperature fuel wherever it can be obtained at a price comparable, value for value, with the price of coal, and the Ministry of Health also agreed to endeavour to persuade local authorities, who have much to gain from smoke abatement, to help on the same lines.

As regards the granting of direct financial assistance for the development of particular processes, assistance can in certain circumstances be afforded to public utility undertakings under the provisions of the Development (Loan Guarantees and Grants) Act, 1929. The attention of concerns working low-temperature carbonization processes has been directed to the possibilities which this Act provides. I propose that my Department should keep very closely in touch with these developments, and help in any direction in which assistance on the lines indicated can possibly be given.

I have also been considering whether anything can be done to increase the use of pulverized fuel, especially for marine purposes.

Surrey County Council Bill.

Wandsworth Gas Company's Petition.

The Surrey County Council Bill, which contains miscellaneous provisions to aid the County Council in the government and administration of the County, has been under consideration for some time by a Select Committee of the House of Commons. One of the petitioners against the provisions of the Bill is the Wandsworth, Wimbledon, and Epsom District Gas Company, and the petition was directed against powers sought by the County Council to acquire lands compulsorily. There is a provision in the Bill that a clause in the Town Planning Act (which prohibits the compulsory acquisition of land belonging to public undertakings) shall not apply to any town planning scheme made under the provisions of the Bill, but that a local authority shall not be entitled to purchase such land compulsorily without the consent of the undertaking concerned, such consent not to be withheld unreasonably. The Company claim that this provision would deprive them of the protection afforded them under the general law in regard to town planning schemes made under the Town Planning Act, 1925.

The Company did not fight the point before the House of Commons Committee, but have reserved their right to oppose when the Bill reaches the Committee stage in the House of Lords.

Guildford Gas and Electricity Bill.

This Bill (the terms of which were set out in the "JOURNAL" for Jan. 7, p. 47), and which was unopposed when it reached the Committee stage in the House of Commons (see "JOURNAL" for April 1, p. 53), was also unopposed in the House of Lords; and the Unopposed Bills Committee of that House, on Tuesday, May 5, ordered it to be reported for third reading. Its main purpose is to empower the Guildford Gas Light and Coke Company to acquire the gas and electricity undertakings of the Cranleigh Gas and Electricity Company, Ltd., on agreed terms. The Bill contains provision for the Guildford Company to dispose of the electricity undertaking if desired.

Report of the Livesey Professor at Leeds

Prof. John W. Cobb, C.B.E., B.Sc., F.I.C., Livesey Professor at the University of Leeds, has submitted his report for the sessions 1928-29 and 1929-30 to the Chairman (Mr. C. F. Tetley, M.A., LL.D.) and members of the Livesey Advisory Committee on the work of the Department of Coal Gas and Fuel Industries (with Metallurgy):

Since the occasion of my last report, the most notable event has been a considerable reconstruction and extension of our departmental premises. In carrying out the building scheme of the University, the first instalment was the erection of new quarters for the Mining Department, which had previously shared housing with us. The funds for the new Mining building were provided largely by the West Yorkshire Coal Owners' Association and the Miners' Welfare Fund. The space so vacated by the Mining Department was placed at the disposal of the Fuel Department, and the opportunity was taken to effect a thorough re-arrangement and re-conditioning of the whole building. This has been done at a cost of over £8000, and has been facilitated by generous contributions to the University Appeal Fund made by members of the Gas Industry and other friends.

In the re-construction all the services have been either renewed or re-conditioned, and the lay-out and equipment of the building are now in harmony with the requirements of modern experimental work, while the extreme congestion to which I have referred in previous reports is relieved.

In June, 1930, the Institution of Gas Engineers held its Annual Meeting in Leeds, under the Presidency of Mr. C. S. Shapley, and members were invited to visit the University, and to see the Department with the new arrangements just completed. The invitation was widely accepted, and a large number of members and friends were shown round by the staff and students, and partook of tea in the new Mining Building, which was also thrown open for inspection. Members of the Council of the Institution and some others were also guests of the University at luncheon on that occasion.

Another notable and gratifying event has been the endowment of a fund at the disposal of the Institution of Gas Engineers, to provide a valuable scholarship, worth £170 per annum, tenable in this Department by an intending entrant to the profession of gas engineering. This scholarship was provided by the generosity of Mr. P. F. Holmes and Mr. D. M. Henshaw, of Huddersfield, first "to perpetuate the memory of William Cartwright Holmes" and also "in recognition of the research work and teaching carried on in the Department." In 1930 it was possible to make the first award of this scholarship to Mr. G. E. Hall, of the Leeds Grammar School, who was selected out of a considerable number of applicants from all parts of the country. It will be remembered that the Corbet-Woodall Scholarship was established on similar lines in 1915.

It is also pleasing to record an increasing entry of students in the Department following steps taken to secure a wider publicity for its record of work and for a knowledge of the careers which have been opened to its graduates. At the moment the severe industrial depression is making itself felt in reducing the demand which has been so insistent for our graduates, but the progressive development of fuel technology is so fully recognized as vital to the general industrial and hygienic welfare that we have no fear as to the future.

At the end of 1929 the arrangement was terminated with the National Benzole Association, whereby its research work was carried out in the Department. The Association was formed on de-control of benzole production after the war, in order to organize the supply and marketing of benzole, mainly as a motor fuel. In 1922 the Association decided to initiate a system of co-operative research. Following the example of the Institution of Gas Engineers it did so by means of a Joint Committee of the Association and the University, which directed a series of investigations on the small and large scale carried out in the Department, and in selected industrial establishments.

Quoting from a leading article in "Chemistry and Industry" on the (latest) Seventh Report of the Committee, "This report is a particularly happy example of co-operation between scientific and business interests. We would commend it to the attention of any of our readers as an example of research work carried out with a definite application to industry, which yet retains a truly scientific attitude, and, if we may be allowed to add, a dignity of presentation. To anyone connected with benzole production or utilization the report is invaluable."

The Association has thus felt encouraged to erect its own Research Laboratory in London in conjunction with the National Benzole Company, and on completion of this laboratory in December, 1929, the work and staff were transferred there.

Students.

The analysis of the number of students in the Department may be stated thus:

—	1928-29.	1929-30.	1930-31.
Full-time students—			
1st year B.Sc. course	4	1	10
2nd " " "	4	4	2
3rd and 4th year B.Sc. course	7	8	5
Post graduate degree students	3	1	3
" " diploma "	..	..	1
Diploma students	1	2	2
Industrial Research students	2	..	1
Occasional students	2	1	1
	23	17	25

The students may be classified thus:

—	1928-29.	1929-30.	1930-31.
Gas Engineering	19	16	24
Fuel and metallurgy	4	1	1

The growing recognition of the importance of a knowledge of fuel processes is demonstrated by the increasing attendance at fuel courses of students from other Departments of the University. In this way, the General Course in Fuel now numbers fifty-four students, drawn from the Departments of Engineering, Mining, Chemistry, Colour Chemistry, Textile Industries, and Leather. The same applies to Metallurgy in which, for example, engineering students are now able to take laboratory instruction; this has long been recognized as desirable, but was not feasible until the laboratory accommodation received its recent extension. In addition, the subjects of Fuel and Metallurgy have been added to the list of introductory courses recognized for the degree of B.Sc. in the University. This means that general science students, including those proposing to enter the teaching profession, will be enabled to acquire some knowledge of these subjects during their stay at the University.

Classes.

All ordinary day classes have been held, and no substantial change has been made in the curriculum for the degree or diploma in Gas Engineering or in Fuel and Metallurgy.

The special evening lectures have been given as detailed below:

In 1929:

(i.) *Furnaces and the Utilization of Fuel* (six lectures), by Prof. J. W. Cobb.

(ii.) *Principles of Gas Distribution* (six lectures), by Mr. Stephen Lacey, B.Sc., Distribution Engineer, Gas Light and Coke Company.

(iii.) *Bye-Product Coking Processes* (eight lectures), by Mr. C. P. Finn, M.Sc., F.I.C., M.I.Chem.E., Manvers Main Collieries Company, Ltd.

In 1931:

(i.) The Manufacture of Coal Gas.

(*a*) *Carbonization Practice* (six lectures), by Mr. T. F. E. Rhead, M.Sc., Chief Chemist, Birmingham Gas Department.

(*b*) *Gas Purification Practice* (six lectures), by Mr. H. Hollings, M.Sc., A.I.C., Chief Gas Chemist, Gas Light and Coke Company.

(ii.) Refractory Materials (eight lectures), by Prof. J. W. Cobb, and four lectures by Dr. J. A. Sugden on the *Physical Properties of Refractory Materials.*

Twenty-six external students in 1929 and seventeen in 1930 attended these lectures, in addition to full-time students of the Department. The numbers from outside in attendance on these courses are not nearly so large as might reasonably be expected, but are drawn from a wide area. (Two lectures are given on one evening, to minimize time and expense in travelling.) These special evening courses are given mainly by lecturers holding responsible industrial positions who speak from first-hand knowledge of the principles and most modern practice in their subjects. They form a valuable integral part of the course of each full-time student, but are so arranged as to be available for outside students also.

Staff.

Several changes in staff have to be reported. These arise from desirable promotions to more senior positions outside the University and from the addition of two members to the staff of the Joint Research Committee of the University and the Institution of Gas Engineers, in order to allow of an increase in the volume of research work carried out for the Committee.

In the autumn of 1928, Dr. Parker resigned from his post as Research Chemist under the Gas Investigation Committee of the Institution of Gas Engineers, to take an appointment as Assistant Director of Water Pollution Research under the Department of Scientific and Industrial Research. He had been associated with this Department for twelve years; and I wish to put on record here my appreciation of the value of his work and the zeal with which he carried out his duties.

In February, 1929, Mr. F. J. Dent, B.Sc., Gas Research Fellow, was appointed to succeed Dr. Parker.

At the end of 1929, Dr. J. A. Sugden resigned his post as Research Assistant and Assistant Lecturer in Refractory Materials to enter the services of the Imperial Chemical Industries, Ltd., who have established at Billingham a new laboratory for investigation of refractory materials and for high temperature work. Dr. A. L. Roberts, of the Chemistry Department of the University, was appointed in July, 1930, to fill his place.

Dr. C. B. Marson resigned on his appointment as Chief Research Chemist to the Northern Coke Research Committee, Newcastle.

Mr. H. Kerr resigned on his appointment to the staff of Messrs. Woodall-Duckham Company, Ltd., London.

Mr. G. B. Howarth resigned on appointment as Chief Chemist to the Newcastle and Gateshead Gas Company.

Dr. W. H. Blackburn, Ph.D., Mr. A. R. Kelly, B.Sc. (London), Mr. E. Parrish, M.Sc., Mr. N. H. Williams, M.Sc., and Mr. W. J. G. Davey, B.Sc. (Liverpool), have been appointed on the staff of the Department as research assistants for the work of

the Joint Research Committee of the University and the Institution of Gas Engineers.

Mr. W. Etheridge, B.Sc. (Leeds), was similarly appointed to assist Dr. A. C. Monkhouse, who had been seconded from the staff of the Joint Research Committee for the work of the Liquor Effluents and Ammonia Sub-Committee of the Institution of Gas Engineers.

Dr. Monkhouse himself has recently been appointed one of H.M. Inspectors under the Alkali Acts.

Research.

The Gas Research Fellowship was held by Dr. F. J. Dent from 1927 to February, 1929. During this time he studied the conditions determining the reactivity of coke to oxygen and to carbon dioxide, and the transformations which carbon undergoes when heated to high temperatures. In February, 1929, he was appointed Research Chemist under the Joint Research Committee of the Institution of Gas Engineers and the University.

In February, 1929, Mr. A. H. Eastwood was appointed to the Gas Research Fellowship, and since then has continued the work begun by Mr. Etheridge on the influence of ash constituents on the liberation of nitrogen during carbonization. In 1929 he presented a thesis thereon for which he was awarded the degree of B.Sc., with First-Class Honours. In 1930 a report on the results was presented to the Institution of Gas Engineers.

The research work of the Department has continued to be assisted by substantial grants from the Department of Scientific and Industrial Research (Fuel Research Board), which enable important problems to be investigated with a continuity which would otherwise be impossible.

Thus since 1927 Dr. W. H. Blackburn has been investigating the scaling of steel in typical furnace atmospheres. The results obtained should have considerable bearing on the development of re-heating practice in metallurgical and engineering industries. It would appear from these experiments that a smoky flame has no advantage in minimizing scaling over a clear reducing atmosphere, such as might be obtained by the controlled combustion of coke.

Dr. Blackburn ceased this work on appointment as Research Assistant on the work of the Institution of Gas Engineers. It is now being continued by Mr. J. E. Knight, particularly in the direction of ascertaining the influence of sulphur oxides on scaling.

Dr. A. Kay, who holds a grant from the Fuel Research Board, has been investigating the factors which determine the reactivity of coke, and in the course of this work has put forward a new method of stating the reactivity which covers in one diagram all known cokes.

Mr. J. H. Dyde, B.Sc., continued the study of the behaviour of carbonized fuels in the open grate, and of the factors influencing this behaviour. In 1929 he submitted a thesis for which he received the degree of M.Sc. After his appointment to the staff of the Plymouth and Stonehouse Gas Company, the work was continued by Mr. G. Milner, B.Sc., whose work has gone far to provide a correlation of the behaviour in the fire with the properties of the fuel as determined in the laboratory. For his thesis on this subject he was awarded the degree of B.Sc. with First-Class Honours.

Mr. Milner has since begun, with the assistance of a grant from the Fuel Research Board, an investigation of the influence of pre-oxidation of the coal used on the reactivity of coke produced therefrom.

Mr. C. B. Bolland, B.Sc., after graduation, has been investigating the reactivity of cokes to oxygen at low temperatures, and for his thesis thereon received the degree of B.Sc. with First-Class Honours. He is now continuing the work with the assistance of a grant from the Fuel Research Board.

Mr. S. Kellett, B.Sc., carried out, under the direction of Mr. Hodsman, a study of the oxidation of ammonium salts containing sulphur, and for his thesis received the degree of B.Sc. with First-Class Honours in 1929. The subject has a bearing on the current problem of disposing of the ammoniacal liquor.

The work was continued by Mr. A. Taylor, B.Sc., who examined particularly the electrolytic oxidation of ammonium salts, and for his thesis received the degree of B.Sc. with First-Class Honours in 1930. The work appeared to be capable of immediate application in various directions and is being actively pursued.

Dr. J. A. Sugden commenced the measurement of the thermal conductivity of heat insulating materials—a subject of growing importance in view of modern demands for the conservation of heat. Since his resignation the work has been continued by Mr. T. H. Blakeley, B.Sc.

Dr. A. L. Roberts, Research Assistant in Refractory Materials, has continued an investigation begun by Dr. Sugden of the resistance to shearing of refractory materials at high temperature.

Mr. Summers has been engaged on a study of the fatigue of metals under alternating stresses.

In the period under review, work has continued to be carried out in the Department for the Joint Research Committee of the University and the Institution of Gas Engineers.

The cracking of creosote oil in different atmospheres and at different temperatures has been studied to evaluate the use of this material as a carburetting agent in the water gas process—a matter of importance in view of the current over-production of tar oils. Two reports have been presented to the Institution of Gas Engineers, but the detailed report is still to be made.

During the summer of 1930, large-scale tests have been carried out on a back-run carburetted water gas plant installed at the Stratford Station of the Gas Light and Coke Company, London. The results have been reported to the Institution, and the work is being followed up by test of another plant at Nine Elms.

In the laboratory a study is being made of the reactivity of coke to CO_2, so as to establish if possible how far the differences observed at lower temperatures persist at the highest attainable temperatures, an important matter from both the theoretical and the practical standpoints.

Mr. James W. Wood has continued his studies of the products of combustion of gas appliances, and the results have been incorporated in the 19th and 21st Reports of the Institution of Gas Engineers. The data obtained should be of great value in assisting to define the conditions for hygienic utilization of gas appliances.

Since Mr. G. B. Howarth's resignation, he has been assisted by Mr. W. J. G. Davey.

Dr. Monkhouse, assisted by Mr. Etheridge, has continued the investigation of gas-works effluent liquors for a Committee of the Institution of Gas Engineers. The precipitation of tar by means of a Lodge-Cottrell electrostatic precipitator was examined at Hinckley Gas-Works. More recent work has been done on the biological purification of effluent liquors at the Coventry Gas-Works, in which useful assistance on the bacteriological side has been rendered by Dr. F. C. Happold, of the Bacteriological Department of the University. Combined with this work has been the investigation of ammonia production from the gas-works point of view. Reports on Effluents and on Ammonia have been presented to the Institution of Gas Engineers.

Mr. W. H. Hoffert, assisted by Mr. G. Claxton, continued their studies of resin formation in benzole in the Department until the end of 1929, when their work was transferred to the new Research Laboratory of the National Benzole Association in London.

Mention may also be made here of the starting of a chemical and physical survey of the West Yorkshire Coalfield in the laboratories of the Mining Department, loaned for the purpose to the Fuel Research Board. A Regional Committee, on which the University is represented by Prof. Ritson and myself, has been appointed for the general supervision of this work, and the Chief Chemist in charge is an old student of this Department, Mr. A. M. Wandless.

Corbet-Woodall Scholarship.

This scholarship was held for the four years, terminating in 1930, by Mr. C. B. Bolland, who took a First-Class Honours degree in Gas Engineering, and continues to work in the Department with a grant from the Fuel Research Board. He was succeeded in his tenure of the Corbet-Woodall Scholarship by Mr. F. Bell, from the Leeds Corporation Gas Department.

Donations.

In 1925, the University launched an appeal for a building fund to remedy the grave shortcomings of its accommodations. Already over £400,000 has been raised, including £8066 from the Gas and Fuel Industries. A donation of special interest is one of ten guineas from an old student of the Department, Mr. R. C. Taylor, B.Sc., who graduated in 1922.

The late Major Arthur Bray, of Geo. Bray & Co., Ltd., Leeds, made a bequest of £1000 to be used for the Department of Metallurgy. This generous gift is the third of its kind made by this firm or its members.

Messrs. W. C. Holmes & Co., Ltd., made and provided an experimental still designed to facilitate the quantitative study of the distillation process. Such gifts are of great assistance to the Department and form one method whereby firms can promote the efficiency of the instruction given.

Appointments of Old Students during the period under review:

A. G. Grant, B.Sc.	Chemical Engineer, Whessoe Foundry and Engineering Company, Ltd., Darlington.
G. B. Howarth, M.Sc.	Chief Chemist, Newcastle and Gateshead Gas Company.
S. Kellett, B.Sc.	South Yorkshire Chemical Company, Parkgate.
H. Kerr	Woodall Duckham Company, Ltd., London.
J. F. Levisohn, B.Sc.	Celanese Company, Ltd., Derby.
C. B. Marson, Ph.D.	Chief Chemist, Northern Coke Research Committee, Newcastle.
F. Allen, B.Sc.	Manager, Carmarthen Gas Company.
K. G. Bodiley, B.Sc.	Weston-super-Mare Gas Company.
R. C. Taylor, B.Sc.	Assistant Manager, Portsmouth Gas Company.
H. Robinson, B.Sc.	Magnesite Syndicate, Salem, S. India.
F. J. Dent, Ph.D.	Research Chemist, Research Committee of the Inst. of Gas Engineers.
W. H. Blackburn, Ph.D.	Research Assistant, Research Committee of the Inst. of Gas Engineers.
A. Taylor, B.Sc.	Woodall Duckham Company, Ltd., London.
J. H. Dyde, B.Sc.	Plymouth and Stonehouse Gas Company.
J. W. Townsend, B.Sc.	Gas Light and Coke Company.
W. R. Branson, B.Sc.	Assistant Manager, Southall Station, Gas Light and Coke Company.
A. M. Wandless, B.Sc.	Chief Chemist, Fuel Research Board Coal Survey Lab., Leeds.
R. Maxwell	Consett Iron Company.
J. J. Priestley, B.Sc.	W. C. Holmes & Co., Ltd., Huddersfield.
W. Etheridge, B.Sc.	Research Assistant, Effluents Research Committee, Inst. Gas Engineers.
R. Neumann, B.Sc.	Woodall Duckham Company, Ltd., London.
A. C. Monkhouse, Ph.D.	Inspector under the Alkali Acts.
S. L. Wright, B.Sc.	Assistant Manager, Colne Gas Department.
J. K. Simpson	Shanghai Gas Company.

GRADUATES.

1929 (June).

Ph.D.	F. J. Dent, B.Sc.
M.Sc.	J. H. Dyde, B.Sc.
B.Sc. (Honours) 1st Class	S. Kellett, B.Sc.
	A. H. Eastwood, B.Sc.
B.Sc. (Ordinary)	C. B. Bolland.
	G. Milner.
	A. Taylor.
	K. G. Bodiley.

1930 (June).

B.Sc. (Honours) 1st Class	C. B. Bolland, B.Sc.
	G. Milner, B.Sc.
	A. Taylor, B.Sc.
B.Sc. (Ordinary)	T. H. Blakeley.
	A. Gillies.
	J. W. Townsend.
	J. K. Simpson.
	C. Riley.

WORKS FACILITIES AND VISITS.

During the vacation students have been given the opportunity of obtaining works experience, and for these valuable facilities our thanks are due to the following. Included are the names of firms who have allowed parties of students and staff to visit their works: Leeds Corporation Gas Department, Bradford Corporation Gas Department, Hartlepool Gas and Water Company, Newark Corporation Gas Department, W. C. Holmes & Co., Ltd., Huddersfield, Manvers Main Collieries Company, Coke Ovens, J. & H. McLaren, Ltd., Leeds, Batley Corporation Gas Department, Scarborough Gas Company, Farnley Iron Company (Fire-Clay Works), Leeds, Cambridge Gas Company, and Whessoe Foundry and Engineering Company, Ltd., Darlington.

PUBLICATIONS.

Twenty-First Report of Gas Investigation Committee. Examination of Products of Combustion from Typical Gas Appliances. Part IV. (Trans. Inst. Gas Engineers, 1929.)

Twenty-Second Report of Gas Investigation Committee. Studies in Carbonization. Part IV. Influence of Various Factors on Ignition Temperature and Structure of Coke. (Trans. Inst. Gas Engineers, 1929.)

Twenty-Third Report of Gas Investigation Committee. Studies in Carbonization. Part V. Temperature, Size of Coal, Blending with Inorganic Compounds. (Trans. Inst. Gas Engineers, 1929.)

Factors Influencing the Reactivity of Coke. (Gas Research Fellowship Report, 1929.) F. J. Dent and Prof J. W. Cobb. (Trans. Inst. Gas Engineers, 1929.)

Second Report of Liquor Effluents Committee. The Disposal of Liquor Effluents from Gas-Works. (Trans. Inst. Gas Engineers, 1929.)

Sixth Report of Joint Benzole Research Committee. Resin Formation in Benzoles. The Comparative Absorptive Efficiencies of Wash Oils for Benzole Recovery. The Reduction of Specific Gravity and Volume to 60° Fahr. Notes on Refining Benzoles by Treatment with Sulphuric Acid. (National Benzole Association, Wellington House, Buckingham Gate, London, S.W. 1.)

Gas Manufacture. Prof. Cobb. (14th Edition Encyclopædia Britannica.)

The Reactivities of Solid Carbon in Fuel Processes. J. W. Cobb. (Trans. Inst. Chem. Engineers, 1929.)

The Equilibrium $CO_2 + C - CO$. F. J. Dent and J. W. Cobb. (J.C.S., 1903, 1929.)

Section on Fuel. H. J. Hodsman. (Annual Report on the Progress of Applied Chemistry, 1928.)

The Radiation of Heat from Gas Lighting Burners. H. J. Hodsman and H. H. Thomas. (Junior Gas Association, 161 (1928-29).)

Seventh Report Joint Benzole Research Committee. Resin Formation in Benzoles. Comparative Efficiencies of Wash Oils for Benzole Recovery. Tests of Gas Oil and Creosote for Benzole Recovery from Coke Oven Gas. (National Benzole Association, Wellington House, London, S.W. 1.)

Twenty-Third Report Joint Research Committee of the University and the Institution of Gas Engineers. Studies in Carbonization. Part V. Temperature, Size of Coal, and Blending with Inorganic Constituents. (Trans. Inst. of Gas Engineers, 1929.)

Twenty-Fourth Report Joint Research Committee of the University and the Institution of Gas Engineers. Use of Creosote in the Manufacture of Water Gas. (Trans. Inst. of Gas Engineers, 1929.)

Fourth Report of Liquor Effluents Research Committee. Processes for the Removal of Phenol. Phenol Recovery in Germany. Spent Liquor Treatment at Cheltenham. (Trans. Inst. Gas Engineers, 1929.)

The Institution and the University: Teaching and Research. J. W. Cobb. (Trans. Inst. Gas Engineers, 1930.)

Smokeless Fuels. H. J. Hodsman. (Chemistry and Industry, 1929, 1110.)

Changes in Thermal Expansion Characteristics During the Burning of a Silica Brick. J. A. Sugden and J. W. Cobb. (Trans. Ceramic Soc., Vol. XXIX., May, 1930.)

First and Second Reports of the Ammonia Sub-Committee. (Trans. Inst. Gas Engineers, 1930.)

Benzole Recovery. W. H. Hoffert and G. Claxton. (Trans. Inst. Gas Engineers, 1930.)

The progress recorded above has only been rendered possible by a zeal and loyalty displayed by the whole staff of the Department, to which I take the opportunity of paying tribute. In particular Mr. H. J. Hodsman, outside his normal duties, has been largely responsible for the mass of detailed work involved in the laboratory reconstruction and extension, and has maintained a useful connection with the local branches of the Society of Chemical Industry and the Institute of Chemistry. The range of Mr. Summers' duties has been increased, and he has been promoted by the University to the grade of Lecturer in Metallurgy.

REGISTER OF PATENTS

Lighting Attachment for Gas Burners.
No. 344,719.

WELLS, J., BURTON, M. G., and BARNSLEY, W., all of Bilston.

No. 14,676; May 13, 1930.

This invention has reference to gas-burner ignition apparatus of the type in which the opening movement of the gas tap or cock is utilized for automatic ignition of the gas through the medium of a friction-wheel sparking device operating under control of intermediate spring-pressed connections to the tap or cock. The invention is designed to provide a particularly simple and reliable construction of apparatus of this type, applicable as an automatic lighting attachment to the gas burner, whether used in connection with gas fires or with gas-heated cookers, stoves, or the like, either for domestic use or for industrial purposes.

Heavy Oils for Carburetted Water Gas.
No. 344,742.

HUMPHREYS & GLASGOW, LTD., of Westminster (Assignees of PERRY, J. A., of Philadelphia).

No. 18,748; June 19, 1930. Convention date, July 27, 1929.

This invention relates to the manufacture of oil gas and water gas, and is particularly directed to the utilization of heavy oils which yield relatively large quantities of coke as compared with ordinary gas oil. The principal object is to provide a process and apparatus by means of which large quantities of such oil may be used for gas making in comparison with the amounts of oil usually employed in carburetted water gas production. These heavy oils are comparatively cheap, but they yield so much carbon that their use in large quantities in existing processes is attended with difficulties in consuming the carbon produced. The usual method of vaporizing gas oil in heated checkerbrick, state the patentees, is not at all satisfactory in the use of heavy oil, due to the clogging of the checkerbrick. Spraying the heavy oil into an empty carburettor handles sufficient oil to take care of ordinary carburetting if the oil is not too heavy.

Where it is desired to use larger amounts of heavy oil than are employed in ordinary carburetted water gas manufacture, other procedure is required. Among the claims made are the following:

1. In the manufacture of gas in a set consisting of two generators adapted to contain fuel beds and a superheater containing regenerating material, the following steps: Air blasting the fuel beds to incandescence, burning the blast gases with air and storing the heat in the generators and in the superheater; introducing heavy oil above the fuel bed in one generator and introducing steam to the lower portion of the fuel bed therein, and passing the resulting gas, in part, through the fuel bed in the second generator and, in part, through the superheater.

2. The additional step which comprises introducing heavy oil to the second generator above the fuel bed and introducing steam to the lower part of the fuel bed therein, and passing the resulting gas, in part, through the fuel bed in the first generator and, in part, through the superheater.

3. The additional step which comprises introducing steam to the superheater, and passing the steam through the superheater and downwardly through the fuel beds in the generators.

4. A cycle consisting of the following steps: Air blasting; generating gas by introducing heavy oil and steam to one generator and passing the resulting gas, in part, through the fuel bed of the second generator and, in part, through the superheater; reversing the direction of the passage of the gas by introducing heavy oil and steam to the second generator and passing the resulting gas, in part, through the fuel bed of the first generator and, in part, through the superheater; and introducing steam to the superheater and passing it down through the fuel beds in both generators.

5. A cycle including the following steps: Air blasting the fuel beds to incandescence, burning the blast gases and storing

the heat of their combustion in the generators and in the superheater; introducing heavy oil to one of the generators above the fuel bed and introducing steam to the lower part of the fuel bed therein, and passing the resulting gas through the superheater; passing steam through the fuel bed in the second generator and passing the resulting gas through the fuel bed in the first generator; introducing heavy oil to the second generator above the fuel bed, and introducing steam to the lower part of the fuel bed therein, and passing the resulting gas through the superheater; passing steam through the fuel bed in the first generator and passing the resulting gas through the fuel bed in the second generator.

6. In the manufacture of gas according to claim 5, the following steps: During the introduction of heavy oil to the first generator, the introduction of steam to the lower part of the fuel bed in the second generator and the passage of the resultant gas together with the gas from the first generator through the superheater; during the introduction of heavy oil to the second generator, the introduction of steam to the lower part of the fuel bed in the first generator and the passage of the resulting gas through the upper part of the second generator and through the superheater.

7. In the manufacture of gas according to claim 5, introducing steam to the superheater and passing the steam through the superheater and down through the fuel beds in the generators between successive cycles.

8. In the manufacture of gas according to claim 5, air blasting the fuel beds in the generators following the introduction of heavy oil and steam to the first generator and of steam to the second generator and preceding the introduction of heavy oil and steam to the second generator and of steam to the first generator.

9. Apparatus for the use of heavy oil in the manufacture of gas.

No. 345,577.

HUMPHREYS & GLASGOW, LTD., of Westminster (Assignees of PERRY, J. A., of Pennsylvania).

No. 17,588; June 6, 1930. Convention date, July 27, 1929.

The following are among the claims made for this invention:

1. In the manufacture of carburetted water gas, blasting the generator fuel bed and a shallow fuel bed at the bottom of a carburetting chamber which is unobstructed by heat-absorbing material such as checkerbrick, steaming the generator fuel bed, and passing the water gas produced through the carburetting chamber from the top towards the shallow fuel bed, simultaneously spraying heavy oil into the top of the carburetting chamber so that resultant coke deposits on the fuel bed, leading off the carburetted gas from the chamber above the fuel bed and subsequently consuming the coke deposited thereon.

2. Apparatus for the use of heavy oil in the manufacture of carburetted water gas comprising a generator adapted to contain a fuel bed, a carburettor, means for producing a sudden change in the direction of the flow of gas through the carburettor, a superheater, inlet means for blast air to the generator and to the carburettor, steam inlet means for the generator, inlet means for secondary air to the carburettor, heavy oil inlet means to the carburettor, and gas offtake means from the bottom of the generator and top of the superheater, the carburettor being provided at the bottom thereof and below the region of change of direction of the flow of gas with means for supporting an ignited fuel bed.

3. Apparatus according to the preceding claim in which the carburettor comprises a grate adapted to support a fuel bed within the carburettor, and a partition cross wall in the upper part of the carburettor terminating short of the grate, a pair of connections having valves therein being provided between the tops of the generator and of the carburettor, and a pair of connections having valves therein between the top of the carburettor and the bottom of the superheater.

4. In the process of the manufacture of carburetted water gas with heavy oil in a set comprising a generator adapted to contain a fuel bed, a carburettor adapted to contain a fuel bed, and a superheater, the following steps: Air blasting to incandescence the fuel beds in the generator and in the carburettor, burning the blast gases, and storing the heat of their combustion in the carburettor and in the superheater; passing steam into the fuel bed in the generator, passing the resulting gas through the carburettor, causing a sudden change in the direction of the flow of the gas while passing through the carburettor, introducing heavy oil into the gas in the carburettor, and passing the carburetted gas through the superheater; passing steam in the opposite direction to that of the previous step through the generator and leading off the resultant gas.

5. A process embodying the steps according to the preceding claim in which the gas resulting from the introduction of steam to the fuel bed in the generator, is passed downwardly in one side of the carburettor, across the fuel bed, upwardly in the other side of the carburettor and through the superheater, and heavy oil is introduced to the gas during the downward passage: the removal of gas resulting from the subsequent passage of steam through the fuel bed in the generator being followed by introducing steam to the fuel bed in the generator, passing the resulting gas through the carburettor in the opposite direction to that in which it previously passed, introducing heavy oil to the gas during its downward pass, and passing the carburetted gas through the superheater; passing steam in the opposite direction to the preceding step through the fuel bed in the generator and leading off the resulting gas.

Ignition Devices for Gas Burners.—No. 344,850.

FALK, H., and FALK, STADELMANN, & CO., LTD., both of Farringdon Road, E.C. 1.

No. 37,623; Dec. 7, 1929.

The object of this invention is to provide means whereby a gas fire may be ignited by means of a flame projected across the direction of the jets of gas emitted from the burners. The ignition device comprises a pilot jet arranged to be placed in communication with and between the main gas supply and the jets, and having frictional means carried thereby operable to ignite a gas jet emitted from the pilot jet in a direction transverse to the jets when the main gas supply to the jets is turned on.

The main gas supply pipe to a gas fire is provided with a substantially vertical secondary supply pipe which is arranged to function as a pilot jet gas supply and which may be controlled by means of a tap. The free end of the supply pipe is provided with an orifice forming a pilot jet arranged to direct a jet of gas immediately in front of or in line with the jets of gas issuing from the gas fire and in a direction transverse to the direction of the flow of gas from the jets. To ignite the gas issuing from the pilot jet a friction device employing a flint of ferro-cerium is operated by a milled edge wheel carried on a spindle.

The device may be arranged within the casing of the gas fire, or it may be affixed exterior to it.

Extractors for Vertical Retorts.—No. 344,860.

WEST, E., and WEST'S GAS IMPROVEMENT COMPANY, LTD., both of Miles Platting, Manchester.

No. 38,109; Dec. 12, 1929.

According to this invention, the extractor chamber and the retort are formed as a continuous chamber having an opening at the bottom sealed by a door, and having an enclosed shutter for cutting off the retort from the extractor chamber as required during coke discharge, a table reciprocable in the coke extractor chamber to support the coke charge during filling of the chamber, and a tiltable wall adapted to be moved away from and towards a fixed inclined wall of the coke extractor chamber to facilitate emptying of the chamber.

The invention further comprises the provision of the shutter for cutting off the retort from the extractor chamber when the tiltable wall is tilted into the accommodation space provided by the inclined wall, upon the tiltable wall. It is preferred to construct the chambers in oppositely disposed pairs, so that each pair of inclined walls constitutes a truss-like supporting structure.

The invention further consists in the provision of an arcuate discharging door carried upon a pivot below the coke column, such pivot taking the load and having means associated therewith for applying seating pressure between the door and the bottom of the coke chamber. It is also preferred to arrange each extractor table to be automatically tilted as it reaches the door opening position at the base of the extractor chamber.

Gas Ring Mountings for Geysers.—No. 345,178.

EWART, J. W., of Euston Road, N.W. 1.

No. 19,819; June 30, 1930.

This invention relates to gas ring mountings for geysers.

The object is to provide a geyser wherein the gas ring may be readily fitted to, or disconnected from, the geyser, and to provide a construction wherein standard fittings may be employed for connecting the gas ring to the gas cock.

In a suitable construction, a gas ring is supported within the base of a geyser by means of a standard gas T-piece, the two oppositely disposed inlets of which are connected respectively to the gas ring at the central portion thereof, and to a base member secured to the bottom of the geyser which serves at the same time to close the aforesaid end. The third opening of the T-piece is connected by means of a length of gas barrel to an elbow, which in turn is connected to a second elbow by means of a nipple. The inlet of the second elbow is connected to the male outlet of any suitable gas cock, the side wall of the hot water geyser being clamped between the usual shoulder on the gas cock and the end of the elbow.

Gas Meters.—No. 345,350.

THORP, F., and PARKINSON & COWAN (GAS METERS), LTD., both of Kennington Road, S.E. 11.

No. 21,192; Dec. 28, 1929.

This invention has reference to means for lubricating certain shafts and bearings of gas meters. An object is to provide an improved bearing mounting and stuffing box for the index shaft, having in conjunction therewith a self-contained lubricating system. There is applied to the index shaft a stuffing box bearing comprising a chamber for gland packing and a spring pressed piston or washer acting upon the packing. A lubricating conduit having a Stauffer or grease reservoir mounted within the casing of the meter is accessible from outside the meter for operation or replenishment. The reservoir cylinder may be closed by a screw-threaded plug accessible from outside the meter. The feed of lubricant or grease to the stuffing box may be effected by a screwed piston.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

Conditions on the Stock Exchange remained unchanged last week, and in spite of the depression the fortnightly settlement was concluded on Thursday last without failures. British Funds maintained their popularity, and it is evident that until trade generally takes a turn for the better investors will continue to regard these securities as the only really safe outlet.

Business in Gas stocks and shares was about normal, and prices in many instances continue to show a hardening tendency. Gas Light £1 units and Imperial Continental capital stock recorded a large number of transactions, and the former rose 6d. to 18s. 6d.-19s. 6d., while the latter fell 5 points to 355-375. There were inquiries for Croydon sliding-scale stock, and the price rose 1 point to 108-111, while at the local exchanges Bristol 5 p.ct. maximum and Liverpool ordinary recorded fractional increases.

For those requiring permanent investments the 4 p.ct. debenture stocks of the Southampton and Tottenham Companies should not be overlooked. Both stocks are irredeemable, and at the current price of 76½ the yield on the former works out at £5 4s. 6d. p.ct. The Tottenham stock has been changing hands during the past few weeks at between 77½ and 79, and the yield in this case at the present price of 78½ is nearly £5 2s. p.ct.

The accounts of the Imperial Continental Gas Association for the year to March 31 show a profit of £552,084, against £468,238 for the 15 months to March 31, 1930. As previously announced, the dividend for the year is increased from 17½ p.ct. to 20 p.ct., which is payable on a larger capital. No allocation has been made to reserves (against £70,000), and after providing £4335 (against £2705) for staff bonus, a balance of £437,369 is carried forward, as compared with £323,084.

The Directors of the Montevideo Gas and Dry Dock Company, Ltd., have recommended a final dividend for the half year to Dec. 31 last of 3 p.ct., free of tax, making 6 p.ct., free of tax, for the year, against 7 p.ct., free of tax, for 1929. The report states that the reduction in the dividend is due entirely to the depreciation in the sterling value of the Uruguayan dollar. After transferring £15,500 to exchange reserve and £2500 to general reserve, and providing for interest on debenture stocks, &c., there remains a net revenue balance of £58,003, including £22,767 brought forward; the dividend for the year absorbs £40,500, leaving £17,503 to be carried forward.

Another dividend announcement is that by the South African Lighting Association, and in this case 5 p.ct., *less* tax, for the year 1930 has been recommended. A similar rate was paid for the year 1929, against 4 p.ct. for 1928.

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *May* 11.

The values of tar products are as follows:

Pitch, 45s. per ton, f.o.b.

Creosote, for export to U.S.A., 5½d. per gallon, f.o.b.

Pure toluole, 1s. 11d. to 2s. per gallon; pure benzole, 1s. 6d. to 1s. 7d. per gallon; 95/160 solvent naphtha, 1s. 4d. to 1s. 5d. per gallon; and pyridine bases, 3s. 3d. to 3s. 6d. per gallon.

All prices of spirits are *ex* sellers' works.

Tar Products in the Provinces.

May 11.

The average prices of gas-works products during the week were: Gas-works tar, 17s. 6d. to 21s. 6d. Pitch—East Coast, 42s. 6d. to 43s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 42s. 6d. to 43s. 6d. f.o.b.* Toluole, naked, North, 1s. 7¼d. to 1s. 7¾d. Coal-tar crude naphtha, in bulk, North, 5⅞d. to 6¼d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 11d. to 1s. Creosote, in bulk, North, liquid and salty, 3¼d. to 3½d.; low gravity, 1¼d.; Scotland, 3¼d. to 3½d. Heavy oils, in bulk, North, 5⅝d. to 5⅞d. Carbolic acid, 60's, 1s. 1d. to 1s. 2d. Naphthalene, £10 to £12. Salts, £3 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in the Provinces.

GLASGOW, *May* 9.

Orders for refined tar are increasing, and the position is not so acute as it was several weeks ago. Other products remain rather quiet with prices unchanged.

Pitch.—Production is low, and prices are nominal at 37s. 6d. to 40s. per ton f.o.b. Glasgow for export, and about 37s. 6d. per ton f.o.r. for the home market.

Refined tar to Ministry of Transport Specification is in better demand, but value is unchanged at 2⅜d. to 2⅝d. per gallon f.o.r. naked.

Creosote.—Owing to the shortage, neutral oil has been advanced fractionally. B.E.S.A. Specification is 2⅜d. to 3d. per gallon; low gravity, 3¼d. to 3⅜d. per gallon; and neutral oil, 3¼d. to 3⅜d. per gallon—all f.o.r. works in bulk.

Cresylic.—Few orders have been placed during the week. Pale, 97/99 p.ct., is 1s. 3d. to 1s. 4d. per gallon; dark, 97/99 p.ct., 1s. 2d. to 1s. 3d. per gallon; and pale, 99/100 p.ct., 1s. 5d. to 1s. 6d. per gallon—all f.o.r. makers' works.

Crude naphtha.—Quotations are firmer at 4¼d. to 4¾d. per gallon *ex* works.

Solvent naphtha.—Conditions are quiet. 90/160 is 1s. 2d. to 1s. 3d. per gallon, and 90/190, about 1s. per gallon.

Motor benzole.—Makers continue to offer at about 1s. 3d. to 1s 4d. per gallon f.o.r. in bulk.

Pyridines.—90/160 is 3s. to 3s. 3d. per gallon; and 90/140, 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole:

	s.	d.		s.	d.	
Crude benzole	0	7½	to	0	8½	per gallon at works
Motor ,, ...	1	2	,,	1	3	,, ,, ,,
Pure ,, ...	1	6	,,	1	7	,, ,, ,,

New Capital Issues.

Swindon United Gas Company.—The issue of £45,000 5½ p.ct. preference stock which was offered on behalf of this Company was considerably over-subscribed, the tenders ranging from £102 down to the minimum of £96 per £100. The lowest accepted tender was at £96 10s. 6d. per £100, the average price obtained being £97 0s. 10d. p.ct.

Trade Notes.

Weir Reciprocating Pumps.

From Messrs. G. & J. Weir, Ltd., of Cathcart, Glasgow, we have received their latest leaflet (publication No. 122) dealing with electrically-driven two-throw reciprocating pumps. Illustrations and specifications are included, together with tables of standard sizes and capacities for oil and water service.

Advertising on Coin Bags.

A novel method of advertising gas has been instituted by Messrs. Lancaster Bros. & Co., Cash Bag Specialists, of Shadwell Street, Birmingham. This constitutes a number of gas slogans printed on the copper bags which the firm are making specially for slot meter collections, and there are 90 changes of advertisement to every thousand bags.

Contracts Advertised To-Day.

High-Pressure Steel Main.

The Workington Corporation Gas Department invite tenders for the supply and laying of a high-pressure steel main, including valves, &c. [Advert. on p. 442.]

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. May 8.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 5	5	5	Aldershot 5 p.c. max. C. ...	77—82	...	...
522,992	,,	,,	4	4	Do. 4 p.c. Pref. ...	75—80	...	...
1,551,868	,,	Apl. 9	7⅜	7⅜	Alliance & Dublin Ord. ...	100—105	...	102—103½
374,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb. ...	70—75	...	...
522,655	,,	Mar. 5	7	7	Barnet Ord. 7 p.c.	124—129	...	...
300,000	1	Apl. 23	1/4⅛	1/9⅜	Bombay, Ltd.	16/6—18/6*	...	17/6—18/3
174,500	10	Mar. 5	9	9	Bournemouth 5 p.c. ...	15—16	...	15⅜—15⅝
500,050	10	,,	7	7	Do. B 7 p.c. ...	12½—13	...	...
439,160	10	,,	6	6	Do. Pref. 6 p.c. ...	11⅛—11⅜	...	...
50,000	Stk.	Dec. 18	3	3	Do. 3 p.c. Deb. ...	60—63	...	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	81—84	...	...
357,900	,,	Mar. 19	7½	7½	Brighton & Hove 6 p.c. Con.	112—117	...	...
371,880	,,	,,	6⅝	6⅝	Do. 5 p.c. Con.	102—105	...	...
1,287,500	,,	Feb. 19	5	5	Bristol 5 p.c. max.	95—96[a]	+½	...
120,420	,,	Dec. 18	4	4	Do. 1st 4 p.c. Deb. ...	78—80[a]	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	78—80[a]	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	99½—100½[a]	...	...
855,000	,,	Apl. 9	7	8	British Ord.	110—115	...	113—114
100,000	,,	Dec. 18	7	7	Do. 7 p.c. Pref.	110—115	...	113¾
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	74—77	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	92—97	...	...
160,000	,,	Jan. 8	5	5	Cambridge 5 p.c. Deb. ...	95—98	...	...
100,000	10	Dec. 4	10	6	Cape Town, Ltd.	9½—10½	...	9½
100,000	10	May 7	4½	4½	Do. 4½ p.c. Pref. ...	6¼—7¼*	−¼	...
150,000	Stk.	Dec. 18	4½	4½	Do. 4½ p.c. Deb. ...	72—77	...	...
626,860	,,	Feb. 19	6	6	Cardiff Con. Ord.	96—99	...	...
237,860	,,	Jan. 8	7½	7½	Do. 7½ p.c. Red. Deb. ...	97—100	...	...
157,150	,,	Feb. 19	5	6⅜	Chester 5 p.c. Ord.	85—90[b]	...	...
98,936	1	May 7	†2/-	†2/-	Colombo, Ltd. Ord.... ...	28/—33/-*	−1/-	...
24,500	1	,,	1/4⅜	1/4⅜	Do. 7 p.c. Pref.	17/6—19/6*	−/6	...
609,204	1	Apl. 9	1/4⅜	15·27[d]	Colonial Gas Assn. Ltd. Ord.	16/—18/-	...	...
296,053	1	,,	1/7⅛	17·67[d]	Do. 8 p.c. Pref.	17/6—19/6	...	...
2,073,280	Stk.	Feb. 19	6	6	Commercial Ord.	93—96	...	...
475,000	,,	Dec. 18	3	3	Do. 3 p.c. Deb. ...	57—60	...	...
787,560	,,	Feb. 19	7	7	Croydon sliding scale ...	108—111	+1	...
453,100	,,	,,	5	5	Do. max. div.	82—85	...	84—85
542,270	,,	Mar. 5	7	10	Derby Con.	120—123[e]	...	...
55,000	,,	Dec. 18	4	4	Do. Deb.	65—70[e]	...	...
209,000	,,	Mar. 5	5	5	East Hull Ord. 5 p.c. ...	72—75	...	...
1,002,180	,,	Mar. 19	†4	†6½	European, Ltd.	90—95	−2	90—94
18,953,033	,,	Feb. 19	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	18/6—19/6[f]	+-/6	18/9—19/3
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	63—66	...	64½—65¾
4,294,691	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	78—81	...	79½—81
5,694,095	,,	Dec. 18	3	3	Do. 3 p.c. Con. Deb. ...	60—63	...	61—62
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	101—104	...	102¾—103½
2,500,000	,,	—	—	—	Do. 4½ p.c. Red. Deb. ...	95—97	...	95—97
161,480	,,	Mar. 5	10	10	Harrogate Cons. 10 p.c. max.	158—163	...	...
82,500	,,	Mar. 19	7	7	Hastings & St. L. 5 p.c. Conv.	98—103	...	...
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	82—85	...	...
70,000	10	Oct. 9	‡	10	Hongkong & China, Ltd. ...	13—14	...	...
213,200	Stk.	Mar. 5	6	6	Hornsey Con. 3½ p.c. ...	91—94	...	...
2,436,594	,,	Nov. 6	25	15	Imperial Continental Cap.	355—375	−5	357—968
223,130	,,	Feb. 5	3½	3½	Do. 3½ p.c. Red. Deb.	78—83	...	79
235,242	,,	Mar. 5	8½	8½	Lea Bridge 5 p.c. Ord. ...	127—130	...	...
2,145,907	,,	Feb. 19	6	6	Liverpool 5 p.c. Ord. ...	99—100[b]	+¾	...
600,000	,,	Mar. 19	7	7	Do. 7 p.c. Red. Pref.	98½—100½[b]	...	...
165,736	,,	Feb. 19	9	9	Maidstone 5 p.c. Cap. ...	128—133	...	...
63,480	,,	Dec. 18	3	3	Do. 3 p.c. Deb. ...	54—57	...	...
75,000	5	Dec. 4	†10	†10	Malta & Mediterranean ...	6—6½	...	...
392,000	—	Apl. 2	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	86—89*	...	...
675,000	Stk.	Nov. 20	†8	†6	Montevideo, Ltd.	95—105	...	...
2,061,315	,,	Mar. 5	5	5⅜	Newcastle & Gateshead Con.	16/9—17/6[f]	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	74—75[d]	...	...
691,705	,,	Jan. 8	3½	3½	Do. 3½ p.c. Deb. ...	67½—68½[d]	...	...
277,285	,,	Nov. 5	5	5	Do. 5 p.c. Red. Deb.	98—100[d]	...	...
199,940	,,	Mar. 5	7½	7½	North Middlesex 6 p.c. Con.	115—120	...	...
396,160	,,	Feb. 5	5	5	Northampton 5 p.c. max. ...	74—79	...	...
300,000	,,	Apl. 23	9	7	Oriental, Ltd.	100—105*	...	102—102½
60,000	5	13 May, '15	—	—	Ottoman	0—¼	...	...
205,162	Stk.	Dec. 18	8	8	Plym'th & Stonehouse 5 p.c.	110—115	...	...
424,416	,,	Feb. 19	8	8	Portsm'th Con.Stk. 4 p.c.Std.	122—127	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	78—81	...	...
686,312	,,	Jan. 22	4	4	Primitiva 4 p.c. Rd. Db. 1911	84—87	...	...
389,813	,,	Dec. 18	4	4	Do. 4 p.c. Cons. Deb.	84—87	...	86—86½
150,000	10	Apl. 9	6	6	San Paulo 6 p.c. Pref. ...	8—8½	...	...
1,736,968	Stk.	Mar. 19	6½	6½	Sheffield Cons.	103—105[c]	...	...
95,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb.	79—81[c]	...	...
90,000	10	June 5	‡4	‡5	South African	4—6	...	...
6,709,895	Stk.	Feb. 5	5	7½	South Met. Ord.	103—106	...	103—104
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	112—115	...	114
1,895,445	,,	Jan. 8	3	3	Do. 3 p.c. Deb. ...	60—63	...	62—62½
734,000	,,	Mar. 5	6½	6½	Do. 6½ p.c. Red. Db.	98—100	...	...
1,000,000	,,	Jan. 22	—	4	Do. 5 p.c. Red. Deb.	100—103	...	102⅛
91,500	,,	Mar. 5	8½	8½	South Shields Con.	107—109[d]	...	...
1,543,795	,,	Feb. 19	6½	6½	South Suburban Ord. 5 p.c.	102—105	...	104½
668,837	,,	Dec. 18	5	5	Do. 5 p.c. Deb.	100—103	...	102½
647,740	,,	Feb. 19	5	5	Southampt'n Ord. 5 p.c. max.	77—80	...	78½—79
121,275	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	75—78	...	...
179,014	,,	Mar. 5	8	8	Sutton Ord.	120—130	...	...
94,500	,,	Jan. 8	5	5	Do. 5 p.c. Deb.	96—99	...	...
250,000	,,	Mar. 5	7	7	Swansea 7 p.c. Red. Pref. ...	96—99	...	...
200,000	,,	Dec. 18	6½	6½	Do. 6½ p.c. Red. Deb.	100—103	...	...
1,076,490	,,	Mar. 5	6⅝	6⅝	Tottenham District Ord. ...	102—106	...	...
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	101—104	...	...
199,005	,,	Dec. 18	4	4	Do. 4 p.c. Deb. ...	77—80	...	78½—79
85,701	,,	Mar. 19	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	74—79	...	...
310,694	,,	Mar. 5	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	102—107	...	...
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	88—93	...	...
1,322,220	,,	Mar. 5	7	7	Wandsworth, Wimbledon, and Epsom Cons. ...	112—115	...	...
426,000	,,	,,	5	5	Do. 5 p.c. Pref.	96—99	...	98½
1,013,464	,,	Dec. 18	5	5	Do. 5 p.c. Deb.	100—103	...	102

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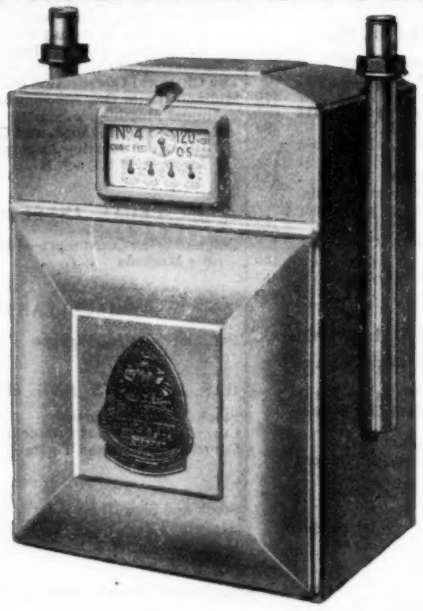

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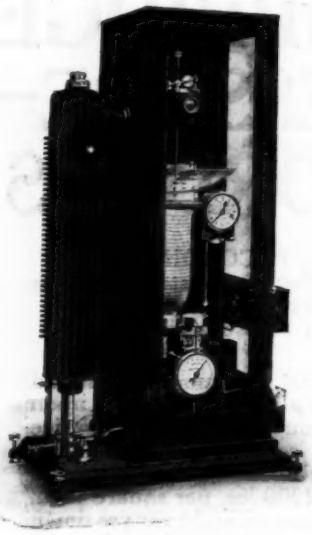

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